

MINERALOGICAL ABSTRACTS

(Vol. 4, No. 8, December, 1930.)

Notices of Books.

BARKER (T. V.). *Systematic crystallography: an essay on crystal description, classification and identification*. London (T. Murby & Co.), 1930, xi + 115, 2 pls., 76 text-figs. Price 7s. 6d.

After a prolonged and patient trial of the Fedorov method of 'crystallo-chemical analysis' [M.A. 2-100], the author has at last come to the conclusion that this method is not a practicable one; and, like another of Fedorov's pupils [A. K. Boldyrev, M.A. 3-159], he goes off at a tangent—but these two co-tangents are not equal. A praiseworthy attempt is made to devise a systematized method of listing crystals in the numerical order of their interfacial angles in such a way that the catalogue may serve for determinative purposes; i.e. from the external angles of a given crystal to find out what is the substance. In the first place, the orientation of the crystal, the axial planes, and the parametral plane are so chosen as to give the simplest set of face-indices; e.g. the thirteen pairs of parallel faces corresponding with the cube, rhombic-dodecahedron, and octahedron should have only 0, 1, and $\bar{1}$ in their face-indices. Then follow various 'common-sense rules', which appear to be quite reasonable, for the purpose of obtaining uniformity of treatment. The selection of angles approximating most closely to 45° recalls Fedorov's 'cubic' and 'tetragonoloid' groups; but here the initial arrangement is simply under the seven systems of crystals. In the skeleton tables given as a sample, organic compounds are mostly used; but of the few minerals that are listed the 'classification angles' for quartz, aragonite, and nitre are exactly the same as the angular elements given by Miller (1852), and for baryte the same as Dana (1892). A good case has been made out, but unfortunately it is not presented in a style that will invite international co-ordination for a future standardized form of description for the geometrical constants of crystals. Irrelevant and argumentative details creep in unexpectedly as a soliloquy; and a foreign reader would find some of the colloquialisms somewhat difficult to follow. Unfortunately also, the author gives out little hope that he will ever be able to complete the tables for the some

8,000 substances that have already been determined crystallographically; and without the tables the method has merely an academic interest. The appendix (pp. 85–115) is a reprint of the cotangent and tangent tables and useful formulae from the author's earlier book [M.A. 2–1].

L. J. S.

BARKER (T. V.). *The study of crystals: a general introduction*. London (T. Murby & Co.), 1930, xvi + 137 pp., 181 figs. Price 8s. 6d.

This book is an extension and amplification of the author's two pamphlets on the study of crystals in schools [M.A. 1–147]. It is intended primarily for the guidance of science masters to such experiments that can be demonstrated with the minimum of apparatus to a class of pupils, with suggestions for exercises for the pupils to work out. Much of the work consists in showing the crystallization of drops of various solutions under the microscope. Models of crystals are made by folding paper, and stacks of cubes illustrate the derivation of crystal-faces by truncation. Many useful hints are given, but often so interlarded with simple cautions and advice as to almost suggest a kindergarten course in crystallography. There is a useful chapter on equilibria between liquid and crystal phases.

L. J. S.

BRIGGS (Dennis Brook). *The study of crystals*. London & Toronto (J. M. Dent & Sons), 1930, 137 pp., 56 figs. Price 4s.

This elementary class-book deals mainly with the chemical side of crystallography. Quite independently, it covers very much the same ground as the preceding book with exactly the same title: the first is from the Oxford school and the second from the Cambridge school. After chapters on solutions and solubility, and on the preparation of crystals, the geometrical relations are simply explained, followed by chapters on polymorphism, isomorphism, enantiomorphism, and the internal structure of crystals.

L. J. S.

JAMES (R. W.). *X-ray crystallography*. With a general preface by O. W. RICHARDSON. London (Methuen & Co.), 1930, vii + 88 pp., 29 figs. Price 2s. 6d.

This small volume is one of Methuen's series of 'Monographs on physical subjects', which are intended to keep advanced students and research workers in touch with recent work in various branches of physics. The chapter headings are: I, Crystal form and the space-

lattice; II, The crystal lattice as a diffraction grating; III, The symmetry of crystals and its determination by means of X-rays; IV, The intensities of X-ray spectra; V, Types of crystal structure. The matter is clearly written, but in parts it is rather an epitome of recent original papers so briefly stated as to be somewhat difficult to follow.

L. J. S.

BOUASSE (H.). *Cristallographie géométrique : groupes de déplacements.*

Bibliothèque scientifique de l'Ingénieur et du Physicien. Paris (Librairie Delagrave), 1929, xxviii + 354 pp., 237 figs. Price [7s. 6d.]

In spite of the strange preface entitled 'Le savant dans la littérature et dans la réalité' this book, by the Professor of Physics in the University of Toulouse, gives a very good account of modern geometrical crystallography. It is clearly written and well illustrated. Starting with the various symmetry operations, the 24 groups of symmetrical polyhedra, 7 systems, 14 space-lattices, 32 crystal-classes, and 230 space-groups are logically derived. Various structures worked out by X-ray methods are illustrated.

L. J. S.

WEYBERG (Zygmunt). *Mineralogja : wykład elementarny wiadomości ogólnych o minerałach i opis minerałów najważniejszych.* Lwów, 1929, xii + 564 pp., 90 figs. Price 32 złotych [= 16s.].

Unlike most text-books on mineralogy, this text-book for students in Poland does not start off with chapters on crystallography. The general part of 260 pages deals with the origin and associations of minerals, their forms of aggregation, chemical and physical characters, methods of determination, artificial production, &c. The descriptive part commences with the silicates and ends with the native elements. Such names as złoto, srebro, and miedź, being the Polish for gold, silver, and copper, may pass for the native elements. Akwamaryn, kware, and aksynit suggest whimsical spellings for aquamarine, quartz, and axinite, but are due to the lack of the letters q and x in the Polish alphabet. (Curiously, however, these missing letters are used in general chemical formulae, e.g. $3[\text{Me}_3(\text{QO}_4)_2]\cdot\text{MeX}_2$ for the apatite group.) But such names as ajuin, djeceit, majersyt, marszyt, szelit, and weleryt are very effective disguises for haüyne, dietzeite, miersite, marshite, scheelite, and wöhlerite, respectively, and rather discourage any attempt at international agreement in nomenclature. Leszaterjeryt is the equivalent of lechatelierite, misprinted as lechaterierite.

L. J. S.

SCHNEIDERHÖHN (Hans). *Anleitung zur mikroskopischen Bestimmung und Untersuchung von Erzen und Aufbereitungsprodukten besonders im auffallenden Licht.* Berlin (Gesell. Deutscher Metallhütten- und Bergleute), 1922, xv + 292 pp., 159 figs., 11 sheets of tables in pocket. Price 10 Mk.

In this text-book on the microscopical examination of opaque minerals ('chalcography'), the general part (pp. 1-148) gives an account of the instruments, preparation of polished surfaces, and methods of investigation; and the special part gives detailed descriptions of forty-four mineral species. There are numerous excellent photomicrographs. The ore-minerals are here dealt with on very much the same lines as the rock-forming minerals in Rosenbusch's classic work. L. J. S.

SANDER (Bruno). *Gefügekunde der Gesteine mit besonderer Berücksichtigung der Tektonite.* Wien (J. Springer), 1930, vi + 352 pp., 155 figs., 245 diagrams. Price 37.60 Mk., bound 39.60 Mk.

Very rich men, masters of the German language and of the mechanics of strains and stresses, may find this book to their liking. We find it both dear and difficult. The aim of Dr. Sander and his collaborators is to trace the tectonic history of rocks by a statistical study of the orientation of mineral grains in relation to structure-planes. Dr. Sander has been writing on the subject since 1911. Much of the material now published has appeared in periodicals which are ordinarily accessible, especially in three articles 'Zur petrographisch-tektonischen Analyse' in the *Jahrbuch der Geologischen Bundesanstalt* in Wien, 1923-26. The method, based on the use of the 'universal stage', is explained in W. Schmidt's 'Gefügestatistik' (Tschermin. Petr. Mitt., 1928, vol. 38, p. 392). Assistance may be expected in the near future from X-ray methods. W. C. S.

LONGWELL (Chester R.). *Outlines of physical geology, prepared from the third edition of part I of a textbook of geology by the late Louis V. Pirsson, Charles Schuchert.* New York (John Wiley & Sons) & London (Chapman & Hall), 1930, v + 376 pp., 1 pl., 276 figs. Price 15s.

This is a shorter form of the third edition of part I of 'A text-book of geology' by L. V. Pirsson and Charles Schuchert [M.A. 4-195]. The chapters on the earth's interior and on ore-deposits have been omitted, but the brief appendix on minerals is retained. Parts of the text included in the chapter on the earth's interior have been incor-

porated in other chapters. All chapters have been shortened and there has been some rearrangement with the object of making the book more elementary. The chapters on sedimentary rocks, volcanoes and vulcanism, igneous rocks, and metamorphism and metamorphic rocks are very clearly written and admirably illustrated. The classification of igneous rocks is a much simplified form of that adopted in L. V. Pirsson's 'Rocks and rock minerals' [M.A. 3-226].

W. C. S.

[НЕСНАЕВ (A. V.) 1864-1915.] Нечаев (A. B.). Минералогия. Изд. 5 посмертное, под редакцией В. А. Зилберминца. [*Mineralogy*. 5th posthumous edition, edited by V. A. ZILBERMINTZ.] Moscow & Leningrad, 1928, viii + 293 pp., 328 figs. [See M.A. 2-242.]

New Minerals.

ANDREATTA (C.). *Bianchite, nuovo minerale*. Atti (Rend.) R. Accad. Lincei, Cl. Sci. fis. mat. nat. Roma, 1930, ser. 6, vol. 11, pp. 760-769, 1 fig.

The new mineral bianchite occurs as a white crystalline crust, with goslarite, melanterite, gypsum, and hydrozincite, on the vitriol walls in the mines at Raibl, Predil [Venezia Giulia, formerly part of Carniola]. Refractive indices for sodium-light are α 1.4652, β 1.4942, γ 1.4946, $2V$ 10° , negative; probably monoclinic. Analysis of material exposed to air not too dry at $15-18^\circ\text{C}$. gave: SO_3 30.13, FeO 8.84, ZnO 20.01, CaO , MgO traces, H_2O 39.92, insol. 1.02 = 99.93, corresponding with $\text{FeZn}_2(\text{SO}_4)_3 \cdot 18\text{H}_2\text{O}$. Material exposed for some days to an atmosphere saturated with water-vapour contained $21\text{H}_2\text{O}$, and that in a desiccator at $15-18^\circ\text{C}$. only $4\text{H}_2\text{O}$. At 150°C . it still contains about $2\text{H}_2\text{O}$, and dehydration is complete at about 260°C . Mixed crystals of $\text{FeSO}_4 \cdot 7\text{H}_2\text{O}$ and $\text{ZnSO}_4 \cdot 7\text{H}_2\text{O}$ in the ratio 1 : 2 have optical characters (α 1.4709, β 1.4785, γ 1.4867, $2V$ $78^\circ 48'$, positive) distinct from those of bianchite, which is regarded as a definite double salt. The mineral dissolves in cold water, and from the solution monoclinic crystals of the melanterite series crystallize.

L. J. S.

AHLFELD (Friedrich). *Ramdohrit, ein neues Mineral aus Bolivien*. Centr. Min., Abt. A, 1930, pp. 365-367, 1 fig.

Bluish grey-black intercrossing prisms (2 cm.) are embedded in quartz with pyrite, stannite, blende, jamesonite, and pyrargyrite,

from the Chocaya la vieja mine, prov. Nor Chichas [i.e. Sud-Chichas], dep. Potosi. They show 'alteration twinning'; sp. gr. 4.18, H. 2. Analysis by W. Brendler gave S 20.1, Sb 31.1, Bi 2.5, Pb 30.3, Ag 10.1, Cu 0.3, Fe 0.3, gangue (SiO_2) 5.5 = 100.2; formula $\text{Ag}_2\text{S}_3\text{PbS}$. $3\text{Sb}_2\text{S}_3$, near fizelyite [M.A. 3-8]. L. J. S.

MICKEY (I. Ja.). *Über eine neue Mineralart aus der Gruppe Nontronit-Beidellit*. Centr. Min., Abt. A, 1930, pp. 293-303.

A chocolate-brown substance, resembling ozocerite in appearance, fills a vein in liparite-pumice-tuff in the ravine of the Chuhchur river, near Mt. Elbrus, northern Caucasus. Sp. gr. 2.28, H. 2, optically uniaxial, n about 1.56. Analysis by G. M. Shershever gave: SiO_2 39.74, Al_2O_3 14.44, Fe_2O_3 7.44, FeO 6.90, MgO 5.11, CaO 0.55, alkalis 2.80, H_2O (110°C .) 17.69, total 94.67, the deficiency being water above 110°C . Over sulphuric acid there is a loss of 14.89% H_2O . The formula is given as $1\text{RO} \cdot 0.8\text{R}_2\text{O}_3 \cdot 0.1\text{R}_2\text{O} \cdot 2.7\text{SiO}_2 \cdot 5.5\text{H}_2\text{O}$. The mineral differs from those of the nontronite-beidellite group in the presence of FeO, MgO, and alkalis, in its lower refraction and absence of pleochroism; and it is named *elbrussite*. L. J. S.

KRAUS (E. H.), SEAMAN (W. A.), & SLAWSON (C. B.). *Seamanite, a new manganese phospho-borate from Iron County, Michigan*. Amer. Min., 1930, vol. 15, pp. 220-225, 1 fig.

Seamanite was found in the Chicagon mine in crevices of a fissured ferruginous siliceous rock. The pale-yellow acicular crystals are orthorhombic with $a:b:c = 0.5195:1:0.4508$, with the forms m (110) and o (111), and distinct basal cleavage. Sp. gr. 3.128, H. 4; soluble in dilute acids and readily fusible; α ($=a$) 1.640, β ($=b$) 1.663, γ ($=c$) 1.665, 'positive' [but negative from the indices], $2V$ about 40° . Analysis gave MnO 56.42, MgO + CaO 1.33, FeO 0.11, B_2O_3 9.94, P_2O_5 15.94, H_2O 14.57, corresponding with $3\text{MnO} \cdot (\text{B}_2\text{O}_3, \text{P}_2\text{O}_5) \cdot 3\text{H}_2\text{O}$. The mineral is closely related to reddingite with boric acid partly replacing phosphoric acid. L. J. S.

LARSEN (Esper S.) & SHANNON (Earl V.). *Two phosphates from Dehrn; dehrnite and crandallite*. Amer. Min., 1930, vol. 15, pp. 303-306.

A specimen of 'Kalkwavellit' from Dehrn, [Nassau], consists of brecciated phosphorite with a white crystalline crust on which are rosettes of white needles. The crystalline crust (anal. I) is described as a new mineral *dehrnite* with the approximate composition $7\text{CaO} \cdot \text{Na}_2\text{O} \cdot 2\text{P}_2\text{O}_5 \cdot \text{H}_2\text{O}$. Sp. gr. 3.04, H. 5; hexagonal with perfect basal

cleavage, ω 1.622, ϵ 1.614. It differs somewhat from the dehrnite from Utah [following abstract]. The needles (anal. II) approximate to $\text{CaO} \cdot 2\text{Al}_2\text{O}_3 \cdot \text{P}_2\text{O}_5 \cdot 6\text{H}_2\text{O}$. They have a perfect longitudinal cleavage, α 1.59 (parallel elongation), γ 1.60. This is probably the mineral analysed by B. Kosmann in 1869 and named 'Kalkwavellit'; it is identified with crandallite [M.A. 1-206].

	P_2O_5 .	Al_2O_3 .	MgO .	CaO .	Na_2O .	K_2O .	$\text{H}_2\text{O} +$.	$\text{H}_2\text{O} -$.	CO_2 .	SiO_2 .	Total.
I.	37.12	trace	—	50.88	7.11	1.20	1.52	0.16	1.49	0.12	99.60
II.	25.24	37.52	0.24	11.04	—	—	17.90	1.00	2.54	4.92	100.40

L. J. S.

LARSEN (Esper S.) & SHANNON (Earl V.). *The minerals of the phosphate nodules from near Fairfield, Utah*. Amer. Min., 1930, vol. 15, pp. 307-337, 1 pl., 3 text-figs.

The nodules occur in a matrix of quartz and calcite in veinlets of limestone, and show concretionary structures with concentric banding and radial cracks with some cavities in which minute crystals are developed. They consist largely of yellow pseudowavellite, but in the larger nodules there are residual cores of bright-green variscite. Other minerals minutely crystallized and intimately intergrown are also present. The material was crushed and sieved, and separated by sliding on paper and in heavy liquids. A large number of minerals were incompletely distinguished by their optical characters, but only for some of them was it possible to collect sufficient material for chemical analyses. Analyses were made on about 100 mg. and allowance was made for impurities by estimating the number of grains under the microscope. Wardite [of J. M. Davison, 1896; not 'J. W. Dennison'] forms pale-green granular layers and is probably tetragonal with perfect basal cleavage; sp. gr. 2.81, H. 5, ω 1.590, ϵ 1.599; analysis I corresponds with $2\text{Na}_2\text{O} \cdot \text{CaO} \cdot 6\text{Al}_2\text{O}_3 \cdot 4\text{P}_2\text{O}_5 \cdot 17\text{H}_2\text{O}$. Soumansite (of A. Lacroix, 1910) is identical with wardite. The yellow mineral identified with pseudowavellite (of H. Laubmann, 1922 [M.A. 2-522]) is very finely fibrous and probably trigonal; sp. gr. 2.92, H. 5, ω 1.618, ϵ 1.623; analysis II suggests $5\text{CaO} \cdot 6\text{Al}_2\text{O}_3 \cdot 4\text{P}_2\text{O}_5 \cdot 18\text{H}_2\text{O}$. Grey spherulitic material and white chalky crusts, giving somewhat different data, are also thought to be pseudowavellite.

	P_2O_5 .	Al_2O_3 .	MgO .	CaO .	Na_2O .	K_2O .	H_2O .	Total.
I.	34.76	36.54	—	3.30	6.68	0.73	17.85	99.86
II.	32.23	34.15	2.06	15.30	—	—	17.50	101.24

The following are described in detail as new species :

Deltaite, $8\text{CaO} \cdot 5\text{Al}_2\text{O}_3 \cdot 4\text{P}_2\text{O}_5 \cdot 14\text{H}_2\text{O}$, trigonal.

Dennisonite, $6\text{CaO} \cdot \text{Al}_2\text{O}_3 \cdot 2\text{P}_2\text{O}_5 \cdot 5\text{H}_2\text{O}$, hexagonal?

Dehrnite, $14\text{CaO} \cdot 2(\text{Na}, \text{K})_2\text{O} \cdot 4\text{P}_2\text{O}_5 \cdot 3(\text{H}_2\text{O}, \text{CO}_2)$ [see preceding abstract].

Lewistonite, $15\text{CaO} \cdot (\text{K}, \text{Na})_2\text{O} \cdot 4\text{P}_2\text{O}_5 \cdot 8\text{H}_2\text{O}$, hexagonal.

Englishite, $4\text{CaO} \cdot \text{K}_2\text{O} \cdot 4\text{Al}_2\text{O}_3 \cdot 4\text{P}_2\text{O}_5 \cdot 14\text{H}_2\text{O}$, orthorhombic.

Millisite, $2\text{CaO} \cdot \text{Na}_2\text{O} \cdot 6\text{Al}_2\text{O}_3 \cdot 4\text{P}_2\text{O}_5 \cdot 17\text{H}_2\text{O}$, monoclinic?

Lehiite, $5\text{CaO} \cdot (\text{Na}, \text{K})_2\text{O} \cdot 4\text{Al}_2\text{O}_3 \cdot 4\text{P}_2\text{O}_5 \cdot 12\text{H}_2\text{O}$, monoclinic?

Gordonite, $\text{MgO} \cdot \text{Al}_2\text{O}_3 \cdot \text{P}_2\text{O}_5 \cdot 9\text{H}_2\text{O}$, monoclinic.

L. J. S.

BERMAN (Harry) & GONYER (F. A.). *Pegmatite minerals of Poland, Maine*. Amer. Min., 1930, vol. 15, pp. 375-387, 8 figs.

Description of a series of specimens collected in 1911 from the abandoned Berry felspar quarry. Pockets in microcline are lined with amblygonite on which is a layer of rhodochrosite and later a number of manganese phosphate minerals. The rhodochrosite is granular or as small crystals (*r M f v V*). Lithiophilite, a light-brown cleavage mass veined with reddingite; analysis I agrees with $2(\text{Mn}, \text{Fe})\text{O} \cdot \text{Li}_2\text{O} \cdot \text{P}_2\text{O}_5$. Eosphorite described in Min. Mag. 17-199. Reddingite (II), colourless to brownish-red, replacing lithiophilite; $3(\text{Mn}, \text{Fe})\text{O} \cdot \text{P}_2\text{O}_5 \cdot 3\text{H}_2\text{O}$. Dickinsonite (III), yellowish-green tabular crystals altering to fairfieldite; $7(\text{Mn}, \text{Fe})\text{O} \cdot 2(\text{Na}_2, \text{K}_2, \text{Ca})\text{O} \cdot 3\text{P}_2\text{O}_5 \cdot \text{H}_2\text{O}$. Fairfieldite (IV), white anorthic folia on dickinsonite; $(\text{Mn}, \text{Fe})\text{O} \cdot 2\text{CaO} \cdot \text{P}_2\text{O}_5 \cdot 2\text{H}_2\text{O}$; the optical orientation is plotted. Landesite (V), a new mineral, as a brown alteration product of reddingite, sometimes as rough crystals pseudomorphous after reddingite; $3\text{Fe}_2\text{O}_3 \cdot 20\text{MnO} \cdot 8\text{P}_2\text{O}_5 \cdot 27\text{H}_2\text{O}$; this composition is near that of salmonsite, while the optical data are near those of sicklerite. Other minerals briefly described are apatite, cassiterite, and beryl; the last showing well-marked etch-figures.

	P_2O_5	FeO.	MnO.	CaO.	Na_2O	K_2O	Li_2O	H_2O	Insol.	Total.
I.	46.35	10.96	31.90	—	0.30	—	9.55	0.40	0.16	99.62
II.	34.52	12.68	38.36	0.15	trace	trace	—	13.16	0.45	100.27
III.	40.78	12.33	31.83	2.01	7.41	1.73	0.20	1.82	1.00	100.78
IV.	39.55	4.75	14.82	30.85	0.41	nil	—	9.70	0.50	100.58
V.	31.94	—	33.65	1.39	—	—	—	13.60	0.13	100.38

II, including Fe_2O_3 0.95. III, MgO 1.67. V, Fe_2O_3 (with some FeO) 13.91, Mn_2O_3 2.69, MgO 3.07.

Sp. gr.	α .	β .	γ .	2V.	Sign.
I. 3.481	1.675	1.679	1.688	60°	+
II. 3.136	1.655	1.662	1.683	65	+
III. 3.266	1.648	1.655	1.662	near 90	+
IV. 3.016	1.640	1.650	1.660	86	+
V 3.026	1.720	1.728	1.735	large	negative

L. J. S.

BAUER (L. H.) & BERMAN (Harry). *Notes on some Franklin* [New Jersey] *minerals*. Amer. Min., 1930, vol. 15, pp. 340-348, 5 figs.

A zinc-bearing amphibole, called zinc-manganese-cummingtonite, as large green prisms hitherto regarded as actinolite, gave analysis I; $H_2(Mg, Fe, Zn, Mn)_7(SiO_3)_8$; sp. gr. 3.44, cleavage-angle mm $54^\circ 28'$, α 1.657, β 1.674, γ 1.685, $2V$ 75° , negative, $\gamma:c = 15^\circ$. Apophyllite, as pale-pink radiating crystals ($c p m$) gave analysis II; $(Ca, K, Na, Mn, Zn)_2Si_3O_8 \cdot 3\frac{1}{2}H_2O$. Barysilitite, as thin films in the ore, gave III; $3PbO \cdot 2SiO_2$; ω 2.033, ϵ 2.015 (Na), dispersion curves are given. Celestine as good crystals ($a m o d z c$) tabular parallel to a , in a cavity in the franklinite ore. The 'clinozoisite' described from this locality [M.A. 4-182] is shown to be chlorophoenicite. Datolite crystals ($b a o c S$) as square pseudo-tetragonal plates parallel to b . A variety of schallerite [M.A. 2-419] in which iron partly replaces manganese is called *ferroschallerite* (anal. IV); $8RO \cdot \frac{3}{4}As_2O_3 \cdot 6SiO_2 \cdot 4H_2O$; sp. gr. 3.44. Manganbrucite, fibrous parallel to c -axis, pure white to deep brown; anal. V of light coloured material; ω 1.59, ϵ 1.60. Svabite: many of the so-called apatites in the ore have been found to contain more or less arsenic, but those in the limestone are pure apatite. Analysis VI corresponds with $63\frac{1}{2}$ mol. % svabite; sp. gr. 3.542, ω 1.684. Another specimen with As_2O_5 16.2 % has sp. gr. 3.446, ω 1.664. A curve shows the relation between the refractive index and chemical composition of the apatite-svabite series.

	SiO ₂ .	Al ₂ O ₃ .	FeO.	MnO.	ZnO.	MgO.	CaO.	Na ₂ O.	H ₂ O.	Total.
I.	49.74	1.72	12.80	13.79	10.46	8.31	0.49	0.22	2.16	99.69
II.	50.90	—	—	0.47	1.79	—	24.74	0.42	17.71	99.73
III.	16.84	0.59	0.23	3.33	0.30	0.78	0.21	—	0.07	99.70
IV.	31.12	—	17.12	29.22	3.63	0.12	—	—	6.42	100.09
V.	—	—	—	17.58	3.56	49.94	n.d.	—	25.97	97.05
VI.	—	—	—	1.23	1.54	0.84	45.89	—	1.32	100.81

II, also K_2O 3.70. III, PbO 77.35. IV, As_2O_3 12.46. VI, P_2O_5 12.54, As_2O_5 35.24, F 1.41, CO_2 trace, PbO 0.51, insol. 0.29.

L. J. S.

HODGE-SMITH. (T.). *Mineralogical notes*. No. IV. Rec. Australian Museum, 1930, vol. 17, pp. 408-413, 4 figs.

Baryte: Northmead, Parramatta, New South Wales.—Detached colourless crystals embedded in mud occur in spheroidal cavities in Hawkesbury sandstone (Triassic) in Pye's quarry. Forms $c b m N o d r z$ [Dana's letters], ϵ (035), and new Z_1 (465). *Sturtite*, a new mineral: Broken Hill, New South Wales.—This is jet-black and compact, very brittle and friable, with yellowish-brown streak; H. 3,

sp. gr. 2.054. Thin sections are pale brown and optically isotropic. It fuses with difficulty to a black magnetic mass, and is decomposed by acids with separation of granular silica. Analysis by H. P. White, SiO_2 32.35, Al_2O_3 0.44, Fe_2O_3 10.22, MnO 25.18, MgO 0.65, CaO 2.19, H_2O (105°) 23.01, H_2O (140°) 1.02, H_2O ($+140^\circ$) 4.13, insol. (SiO_2) 0.79, = 99.98, gives the formula $\text{Fe}_2\text{O}_3 \cdot 6(\text{Mn}, \text{Ca}, \text{Mg})\text{O} \cdot 8\text{SiO}_2 \cdot 23\text{H}_2\text{O}$ or $\text{FeR}_3''\text{H}_3\text{Si}_4\text{O}_{14} \cdot 10\text{H}_2\text{O}$, a salt of orthodisilicic acid ($\text{H}_6\text{Si}_2\text{O}_7$). Associated minerals are quartz, spessartine, rhodochrosite, galena, blende, &c. Wolframite: Mount Bell district, Tasmania.—A crystal (6 cm.) with fluorite shows the forms $abltf\sigma$ [Dana's letters]. L. J. S.

SIMPSON (Edward S.). *Contributions to the mineralogy of Western Australia. Series V.* Journ. Roy. Soc. W. Australia, 1930, vol. 16 (for 1930–31), pp. 25–40, 1 fig. [Cf. M.A. 4–314.]

(1) Anhydrite, Kalgoorlie, Central Division.—Mauve-coloured cleavage masses from a quartz vein in the Perseverance gold mine gave SO_3 58.94, CaO 40.47, SrO 0.71, BaO 0.05, H_2O 0.40 = 100.57, sp. gr. 2.97. (2) Celestine, Kalgoorlie.—Pink granular masses from a quartz vein in the Perseverance mine consist of a mixture of celestine, calcite, and quartz. (3) Axinite, Talbot Bay, Kimberley Division.—Brown crystals (*Mmbesy*) from the junction of greenstone-schist and gneiss gave analysis I; sp. gr. 3.25. (4) Chloritoid, Kalgoorlie.—Small (1 mm.) plates with ragged edges are scattered through chlorite-schists (rock analyses given) and are crowded with minute inclusions. They show multiple twinning on the basal plane; pleochroism α green, β blue, γ yellow, $\alpha : c = 4-6^\circ$ (or up to 11°). Anal. II (after deducting included quartz 7.35 and rutile 1.46 %) agrees with the formula $\text{H}_2(\text{Fe}, \text{Mn}, \text{Mg})\text{Al}_2\text{SiO}_7$; sp. gr. (corrected) 3.54. (5) Gahnite, Gillingarra, S.W. Div., and Wodgina, N.W. Div.—Small dark grey-green grains scattered through mica-schist from Gillingarra gave Al_2O_3 57.70, Cr_2O_3 0.09, ZnO 31.38, FeO 8.54, NiO 0.01, MnO 0.10, MgO 2.38 = 100.20; sp. gr. 4.38, n 1.782. At Wodgina pale yellowish-green octahedra (5–10 mm.) are found in the surface soil with tantalite. (6) Hypersthene, Warambu, Murchison Division.—Dark greyish-green cleavage slabs (10 cm.) with prism cleavage approximately 90° , straight extinction and positive elongation, α 1.678, β 1.664, γ 1.654, sp. gr. 3.45, gave anal. III by H. P. Rowledge. (7) *Maitlandite* and *nicolayite* (spp. nov.), Wodgina, N.W. Div.—These two amorphous minerals were described with analyses in 1912 and were then provisionally referred

to mackintoshite and thorogummite respectively, but they are now regarded as chemically distinct:

Mackintoshite (black)	...	$3\text{ThO}_2 \cdot \text{UO}_2 \cdot 3\text{SiO}_2 \cdot 3\text{H}_2\text{O}$.
Maitlandite (black)	...	$2(\text{Pb}, \text{Ca})\text{O} \cdot 3\text{ThO}_2 \cdot 4\text{UO}_2 \cdot 8\text{SiO}_2 \cdot 23\text{H}_2\text{O}$.
Nicolayite (yellow)	...	$2(\text{Pb}, \text{Ca})\text{O} \cdot 3\text{ThO}_2 \cdot 4\text{UO}_3 \cdot 8\text{SiO}_2 \cdot 21\text{H}_2\text{O}$.
Thorogummite (yellow)	...	$2\text{ThO}_2 \cdot \text{UO}_3 \cdot 3\text{SiO}_2 \cdot 6\text{H}_2\text{O}$.

Nicolayite and thorogummite have been derived by the weathering and autoxidization of the corresponding UO_2 minerals. By further weathering nicolayite passes into pilbarite and finally into hydrothorite [M.A. 3-544]. (8) Opal, Poona, Murchison Division.—Platy masses of bright green opal (anal. IV), found in a quartz vein, show hexagonal markings and are perhaps pseudomorphous after stichtite or kämmererite. (9) Pseudomalachite, Collier Bay, Kimberley Division.—Analysis of impure material suggests the formula $5\text{CuO} \cdot \text{P}_2\text{O}_5 \cdot 3\text{H}_2\text{O}$. (10) Riebeckite, Hamersley Range, N.W. Division.—Indigo-blue asbestos (crocidolite or fibrous riebeckite), as flexible cross-vein fibres up to 5 cm. long, has been found at several places in banded siliceous ironstones (jasperoid); analyses by J. N. Grace, V from Mt. Margaret, sp. gr. 3.31, and VI from Willi-Wolli, sp. gr. 3.27.

	SiO_2 .	Al_2O_3 .	Fe_2O_3 .	FeO .	MnO .	MgO .	CaO .	$\text{H}_2\text{O} +$	$\text{H}_2\text{O} -$.	Total.
I.	42.14	17.67	1.74	6.81	3.09	2.06	19.96	1.56		100.59
II.	23.74	39.01	3.04	23.98	0.49	1.61	1.02	7.72		100.61
III.	48.56	0.37	7.83	27.24	0.63	12.39	0.75	2.19	nil	100.22
IV.	77.26	0.69	0.37	0.14	—	2.03	0.46	6.29	5.93	99.80
V.	51.86	0.03	20.26	14.84	0.01	3.26	0.49	1.97	0.68	99.90
VI.	51.94	0.24	18.93	15.25	0.01	3.94	0.40	2.67	0.72	100.37

I, also B_2O_3 5.56. III, also TiO_2 0.18, K_2O 0.08. IV, also Cr_2O_3 6.41, Na_2O 0.06, K_2O 0.12, TiO_2 trace, P_2O_5 0.04. V, also Na_2O 6.12, K_2O 0.28, TiO_2 0.03, CO_2 0.02, P_2O_5 0.05. VI, also Na_2O 6.00, K_2O 0.26, TiO_2 0.01.

L. J. S.

SCHOEP (A.) & CUVELIER (V.). *Sur la stainierite (un hydroxide cobaltique), nouveau minéral*. Bull. Soc. Belge Géol. Pal. Hydrol., 1930, vol. 39 (for 1929), pp. 74-82, 2 figs. [Cf. M.A. 4-248.]

The mineral occurs in some quantity in the upper oxidized portion of a mineral vein at Mindingi, Katanga. Analysis of material separated as far as possible from intermixed malachite, haematite, kaolin, and quartz, gave Co_2O_3 68.72, Fe_2O_3 9.45, Al_2O_3 6.87, CuO 2.68, SiO_2 2.67, H_2O 10.15 = 100.54, corresponding with $(\text{Co}, \text{Fe}, \text{Al})_2\text{O}_3 \cdot \text{H}_2\text{O}$. This composition approaches that of transvaalite. The mineral is readily soluble in hydrochloric acid with evolution of chlorine. It is black and compact with in places a shining mamillated surface;

streak black, sp. gr. 4.137, H. 4½. It is opaque with a granular or banded concentric texture. In reflected polarized light it is birefringent and pleochroic; measurements are given of the reflective power at different azimuths. The mineral is regarded as the crystalline equivalent of the colloidal heterogenite; and a preliminary X-ray examination by W. F. de Jong suggests that it is isomorphous with goethite.

L. J. S.

WRIGHT (F. E.) & ALLEN (E. T.). *Curtisite, a new organic mineral from Skaggs Springs, Sonoma county, California.* Amer. Min., 1930, vol. 15, pp. 169–173. [Cf. M.A. 3–239; there for 'α 1.577' read α 1.557.]

Curtisite occurs as greenish-yellow flakes with opaline silica, realgar, and metacinnabarite in crevices in sandstone, from which hot springs emit inflammable gases. Sp. gr. 1.236. New analyses on material purified by several recrystallizations from benzole gave C 94.12 (93.70), H 5.73 (5.41). Molecular weight determinations by the lowering of the boiling-point of a solvent gave values ranging from 211.6 to 291.4. The most probable formula is $C_{24}H_{18}$. The purified material is pale yellow and melts at 370° C., turning black. Heated in an open tube it sublimes as thin flakes.

L. J. S.

WALKER (T. L.). *Lodestone from Bon Accord, Transvaal.* Univ. Toronto Studies, Geol. Ser., 1930, no. 29, pp. 17–19, 1 pl.

A fine specimen of lodestone, 2 feet long and weighing 150 lb., with strong polarity was collected from the outcrop of iron-ore in the norite of the Bushveld. The fine powder is black with a chocolate tinge. Apart from limonite, about 95 % of the black material consists of a single mineral which is anisotropic to reflected polarized light. Analysis by M. C. Haller gave SiO_2 0.50, TiO_2 15.50, Al_2O_3 1.42, Fe_2O_3 63.76, FeO 16.43, MnO 0.37, MgO 1.12, H_2O 1.34 = 100.44; sp. gr. 4.70. This might be interpreted as magnetite 54.06, ferric titanate 35.32, limonite 9.35 %, the ferric titanate (near $2Fe_2O_3 \cdot 3TiO_2$) representing perhaps a dimorphous magnetic form of pseudobrookite. Recasting the analysis as Ti_2O_3 13.95, Fe_2O_3 79.26, FeO 2.48, a more probable interpretation is sesquioxides $(Fe,Ti)_2O_3$ 76.67, spinel 13.87, limonite 9.35 %. For this dominant magnetic and anisotropic mineral $(Fe,Ti)_2O_3$, perhaps related to ilmenite, it is proposed to use the name *maghemite*, which was originally suggested by P. A. Wagner for magnetic ferric oxide [M.A. 4–215].

L. J. S.

SOLTYS (Arnulf). *Über das Josen, einen neuen Kohlenwasserstoff aus steirischen Braunkohlen*. Sitzungsber. Akad. Wiss. Wien, Math.-naturw. Kl., Abt. II b, 1929, vol. 138 (Supplement), pp. 175-184, 1 fig.; Monatshefte Chem. Wien, 1929, vol. 53-54, pp. 175-184, 1 fig. [Cf. M.A. 2-474.]

— *Über drei aus steirischen Braunkohlen extrahierbare Verbindungen*. Ibid., pp. 185-186.

The late K. B. Hofmann of Graz examined, and applied the name josen [after his wife Josepha] to, hartite from the lignite deposits of Köflach and Voitsberg in Styria. The mean of his three unpublished analyses (C 87.39, H 12.42) led to the formula C_3H_5 . The crystals have been measured by F. Machatschki [M.A. 2-474]. New analyses (C 87.67, 87.72; H 12.49, 12.27) and molecular weight determinations (273) of material recrystallized from alcohol give a formula $C_{20}H_{34}$, and this is confirmed by the preparation of a derivative $C_{20}H_{28}S_3$. The melting-point is 74° , and the specific rotatory power in alcohol $[\alpha]_D^{22} + 23.81^\circ$. Treated with selenium it yields retene. From various positive and negative reactions alternative structural formulae are suggested. [The substance is admitted to be identical with hartite (W. Haidinger, 1841), and why it should be described as a new hydrocarbon is not clear. Some abstracts of this paper add further confusion by giving the name as 'iosene'.]

The lignite from these localities when extracted with petrol yields small amounts of: (1) white needles with m.p. 265° , $[\alpha]_D^{22} - 19.1^\circ$, and composition near that of sterol ($C_{30}H_{50}O$); (2) an oil, $C_{15}H_{26}$, $d^{22} 0.8994$, b.p. 265° , $[\alpha]_D^{22} + 5.62^\circ$; and (3) 'josen'. L. J. S.

Growth and Corrosion of Crystals.

SCHAUM (K.) & SCHEIDT (E. A.). *Begünstigung der Kristallbildung durch elektrische Einwirkungen*. Zeits. Anorg. Chem., 1930, vol. 188, pp. 52-59.

The production of a crystallization-nucleus is supposed to be preceded and induced by the parallel orientation of a number of molecules through their electrical fields. On this hypothesis, electric fields were expected to influence crystallization. Experiments showed that a rectified alternating E.M.F. of 50-80 kilovolts definitely increased the production of nuclei and relieved the supersaturation of supercooled liquids. Sparks between electrodes immersed in the liquid very rapidly caused crystallization. The Tesla discharge was

also effective, and so was a stream of oxygen ionized by an electric discharge in a separate tube. M. H. H.

TAMMANN (G.). *Die Abhängigkeit der Zahl der Kristallisationszentren von der Temperatur.* Zeits. Anorg. Chem., 1929, vol. 181, pp. 408-416.

On the assumption that a crystallization-nucleus consists of a single unit cell of the crystal, equations based on the kinetic theory are derived for the probability of the formation of a nucleus. The theory leads to the characteristic maximum in the (number of nuclei: temperature) curve. M. H. H.

FRIEDEL (G.). *Sur la théorie de K. Spangenberg relativement à la croissance et à la décroissance des cristaux.* Bull. Soc. Franç. Min., 1929, vol. 52, pp. 111-121.

A criticism of Spangenberg's theory of crystal growth [M.A. 4-171] and of Neuhaus's experimental results on sodium chloride [M.A. 4-173]. F. A. B.

KORDES (E.). *Reaktionen im festen Gemengen.* Glastechnische Berichte, herausgegeben von der Deutschen Glastechnischen Gesellschaft, Frankfurt am Main, 1928, vol. 6, pp. 44-50, 5 figs.

The author gives a short review of recent work showing that the crystalline state of matter is not so chemically inert as was formerly supposed. It is well known that a critical temperature must be reached in order that physical and chemical action may take place in the solid state and also that the crystalline particles must be in intimate contact. The cold-working of metals, for instance, brings about this latter condition; photographs of sections showing the recrystallization of aluminium and zinc powders at 200° C. after cold-drawing are given in illustration. Limestone heated under pressure at 1100° C. develops relatively large crystal grains. G. Tammann (1926) has expressed the temperatures at which atomic interchange may take place in a crystalline body in terms of the melting-points for metals, salts, and molecular compounds. Further considerations show that the lowering of the melting-point of a substance by the addition of a second substance is closely related to the temperature at which atomic interchange begins. Thus the addition of fluorite to wollastonite lowers the melting-point of the former by 250° C., whereas for calcium chloride the effect is negligible since the atomic interchange temperature for calcium chloride is

much lower than it is for fluorite. It may also happen that the course of a reaction may be oppositely directed in the solid state and in solution. The author concludes with a note on the applications of these results to glass technology.

F. A. B.

ROYER (L.). *De l'influence possible du milieu ambiant sur la symétrie des formes de quelques minéraux naturels.* Compt. Rend. Acad. Sci. Paris, 1930, vol. 190, pp. 503-505.

Different portions of a face (111) of a rhombic sulphur crystal treated with crude petroleum and carbon disulphide show etch-figures indicating hemihedral and holohedral symmetry respectively. Rhombic sulphur is considered to be holohedral; the apparent hemihedral characters of certain crystals is conditioned by the mother-liquor. Brown peat-water, for instance, constitutes a medium in which deposited sulphur crystals exhibit lower symmetry.

F. A. B.

BUCKLEY (H. E.). *The crystallization of potash-alum and the effect of certain added impurities on its habit.* Zeits. Krist., 1930, vol. 73, pp. 443-464, 19 figs.

A study is made of the crystallization of alum under different physical conditions. Rapid growth results in octahedra modified occasionally by a (100) plane. Only under conditions of extremely slow growth are the three forms (111), (110), and (100) equally developed. There is a tendency for the (110) form to predominate over the (100) form when the slow growth is induced by slow cooling rather than evaporation. It is deduced that the relative rate of growth of the (100) face to that of the (111) face cannot in these experiments be greater than 1.732 : 1; Spangenberg's greater values are probably due to the rapid stirring which he used throughout his work on rate of growth [M.A. 4-171]. The author has studied the influence on habit of the addition of twenty-seven different substances. The different forms developed are enumerated, but further data are needed to form a theory of the relation between the rate of growth of a given plane and the constitution of the added substance.

F. A. B.

BUCKLEY (Harold E.). *The influence of RO_4'' and related ions on the crystalline form of sodium chlorate.* Zeits. Krist., 1930, vol. 75, pp. 15-31, 12 figs.

Sodium chlorate grows normally as cubes, and the addition of such substances as the alkalis, Rochelle salt, $KClO_3$, $Ba(ClO_3)_2$, Na_2CO_3 ,

night blue, Bismarck brown, safranine, indigo, naphthol yellow, urea, ethyl alcohol, or amyl alcohol produce no change in the cubic habit. But a passage from the cubic to the tetrahedral habit occurs when substances are added containing ions SeO_4 , ClO_4 , Cr_2O_7 , CrO_4 , SO_4 , S_2O_3 , B_4O_7 , or S_2O_6 . The cube faces disappear as soon as the proportion of the added ion to the ClO_3 ion is respectively 3:1, 2:1, 1:1 (or higher), 1:1, 1:7, 1:20, 1:60, 1:1000. H. H.

NOTHHAFT (J.) & STEINMETZ (H.). *Über die Verteilung von Fremdsustanzen in Kristallen.* Chemie der Erde, 1930, vol. 5, pp. 225-232, 2 pls.

Describes the distribution of colour and inclusions in various minerals and in crystals of lead nitrate grown from solutions containing various colouring matters. In fluorite the bands of colour parallel to the cube faces are built up of minute fibres perpendicular to the cube faces; and there are diagonal areas in the crystal free from inclusions. The observations are discussed in connexion with the growth of crystals. L. J. S.

BOLDYREW (A. K.). *Über die Konzentrationsströmungen und über die Ursache des Schichtens der Lösungen.* Zeits. Krist., 1930, vol. 74, pp. 552-553, 2 figs.

It is shown that the formation of denser layers of a solution at the bottom of a vessel, in which three crystals are immersed at different depths, is due to convection currents set up by the growth or solution of the crystals. The layers are not found when the crystals are absent. H. H.

KALB (Georg). *Typische dreiseitige Vizinalpyramiden auf dreieckigen Grundflächen.* Zeits. Krist., 1930, vol. 73, pp. 561-566, 8 figs.

Proceeding as before [M.A. 4-300], the author derives the five possible cases of triangular vicinal pyramids upon triangular crystal-faces. Examples, with figures, are given of the five types, together with an example of the occurrence of a hexagonal vicinal pyramid upon a triangular face (diamond). The symmetry-classes for the triangular and hexagonal vicinal pyramids are also enumerated. Measurements of natrolite crystals from three localities show that in this case the presence of the vicinal pyramids does not prevent fairly accurate axial ratio determinations. F. A. B.

KALB (Georg). *Abhängigkeit der Gestalt der Vizinalpyramiden von der Trachtausbildung der Kristalle.* Zeits. Krist., 1930, vol. 74, pp. 469-475, 10 figs.

A description is given of the development of vicinal faces on crystals of baryte, apophyllite, apatite, and idocrase illustrating the dependence of such faces on the habit of the crystal. H. H.

ERNST (E.). *Das Verhalten der echten Ätzhügel eines aus einer Flußspatkugel gewonnenen Lösungskörpers.* Festschrift Victor Goldschmidt, Heidelberg, 1928, pp. 89-97, 1 pl., 1 text-fig.

Minute (0.1×0.04 mm.) etch-hills are present on the rounded triakisoctahedral faces produced by the solvent action of nitric acid on a sphere of fluorite [M.A. 1-306]. These are described and figured, and the light-figures reflected by them are plotted.

L. J. S.

MENZER (G.). *Über die mikroskopische Unterscheidung von Ätzhügeln und Ätzgrübchen im durchgehenden Licht.* Zeits. Krist., 1930, vol. 75, pp. 143-146, 10 figs.

Etched hillocks and pits seen through the microscope on the face of a transparent crystal can be distinguished as follows, if the sides of the hillock or pit are not too steeply inclined to the crystal-face. The etched figure appears surrounded by a dark line and crossed by bright lines, if the figure is a hillock and the microscope tube is slightly raised, or if the figure is a pit and the tube lowered. In other cases the figure is surrounded by a bright line and crossed by dark lines. H. H.

ADAMS (John Mead). *The origin of snowflakes.* Physical Rev., 1930, vol. 35, pp. 113-114.

—— *The polar properties of single crystals of ice.* Proc. Roy. Soc. London, Ser. A, 1930, vol. 128, pp. 588-591, 1 pl.

Single crystals of ice were formed by mixing a current of cold dry gas (from liquid air or oxygen) with a current of air saturated with water-vapour at slightly above 0°C . An opalescent cloud is formed and minute particles (0.005 mm.) are deposited on the glass floor of the chamber; these continue to grow at the expense of any further deposit until they reach a size of 0.02 mm. These crystals have the form of short hexagonal prisms with basal planes. When etched by exposure to warm dry air they sometimes show a pit at one end only

of the *c*-axis. Pits at both ends or at the centre of the crystal are explained by twinning on the basal plane. L. J. S.

LAEMMLEIN (Georg). *Korrosion und Regeneration der Porphy-Quarze*. Zeits. Krist., 1930, vol. 75, pp. 109–127, 15 figs.

A study of the bipyramids of porphyritic quartz formed above 575° C. in igneous rocks suggests that the frequent rounding of the edges is due to fusion rather than corrosion by the magma. The deep embayments are not the results of corrosion, but represent skeletal growths of the crystal. Other irregularities are ascribed to the breaking apart of groups of crystals and the regeneration of the broken crystals. These features and the zonal structures are best studied in thick sections. L. J. S.

ICHIKAWA (Shimmatsu). *The natural etchings of Japanese pyrite crystals*. Amer. Journ. Sci., 1929, ser. 5, vol. 17, pp. 245–257, 8 pages of figs.

A large number of detailed drawings and photographs are given of the surface markings (pits, hillocks, and striations) on the different faces of pyrite crystals from various Japanese localities. In shape they conform with the hemihedral symmetry of the crystals. L. J. S.

HOLZNER (Julius). *Lösungserscheinungen an Calcit von Roith*. Festschrift Victor Goldschmidt, Heidelberg, 1928, pp. 163–169.

Isolated crystals of calcite, found embedded in a clay seam in a limestone quarry at Roith in Lower Austria, show the forms *v m e M E* [Dana's letters] and are deeply corroded. A description is given of the various forms of corrosion—etch-grooves along cleavage-cracks, etch-pits, etch-hills, and flow-channels—on each of these faces, and the light-figures are drawn. L. J. S.

Chemical Constitution of Silicates.

BRAGG (W. L.). *The structure of silicates*. Zeits. Krist., 1930, vol. 74, pp. 237–305, 24 figs. Also issued as a separate pamphlet, Leipzig (Akademische Verlagsgesellschaft), 1930, 69 pp., 24 figs. Price 5 Mk.

The structure of those silicates whose atomic positions have been completely determined is summarized, and the results published in a list of 52 papers by various authors are compared. The silicates are distinguished from combinations of PO_4 , SO_4 , ClO_4 , &c., with metallic ions by the way in which SiO_4 groups can be linked together

to form indefinitely extending complexes. The silicon is found between a regular group of four oxygen atoms, the distance between two neighbouring oxygen atoms being about 2.6 Å. and between a silicon and the nearest oxygen atoms being about 1.62 Å. The linking between one silicon atom and another is always effected through an intermediate oxygen atom.

H. H.

BORGSTRÖM (Leon H.). *Chemismus der Mineralien der Sodalith- und der Cancrinitgruppe*. Zeits. Krist., 1930, vol. 74, pp. 113-130, 2 figs.

The composition of members of the sodalite group is given as sodalite $3\text{Na}_2\text{Al}_2\text{Si}_2\text{O}_8 \cdot 2\text{NaCl}$, haüyne $3\text{Na}_2\text{Al}_2\text{Si}_2\text{O}_8 \cdot 2\text{CaSO}_4$, nosean $3\text{Na}_2\text{Al}_2\text{Si}_2\text{O}_8 \cdot \text{Na}_2\text{SO}_4$, anorthite-haüyne $3\text{CaAl}_2\text{Si}_2\text{O}_8 \cdot 2\text{CaSO}_4$, with isomorphous mixing of $3\text{K}_2\text{Al}_2\text{Si}_2\text{O}_8 \cdot 2\text{NaCl}$, &c. Cancrinite is taken as $3\text{Na}_2\text{Al}_2\text{Si}_2\text{O}_8 \cdot 2\text{CaCO}_3$, with $\text{CaAl}_2\text{Si}_2\text{O}_8$ or $\text{K}_2\text{Al}_2\text{Si}_2\text{O}_8$ replacing $\text{Na}_2\text{Al}_2\text{Si}_2\text{O}_8$ and Na_2CO_3 or CaSO_4 or CaCl_2 replacing CaCO_3 .

H. H.

ZAMBONINI (F.) & FERRARI (A.). *Sulla identità di struttura cristallina della cancrinite del Monte Somma con quella di Mias*. Atti (Rend.) R. Accad. Lincei, Cl. Sci. fis. mat. nat. Roma, 1930, ser. 6, vol. 11, pp. 782-788.

The optical characters of cancrinite from Monte Somma, Vesuvius, are identical with those of cancrinite from Laacher See, Rhine. The variable amount of water, which is expelled at 375° C. without alteration of the optical characters, is regarded as unessential. A crystal of cancrinite from Monte Somma gave by the rotating-crystal X-ray method a cell of dimensions $a = 12.73$ $c = 5.10$ Å. ($c/a = 0.4088$). This agrees with the value determined by Gossner and Mussgnug [M.A. 4-279] for cancrinite from Miask, Urals, and also with the ratio ($c/a = 0.4052$) for Laacher See cancrinite. For one molecule to be accommodated in the unit cell the formula of cancrinite is modified as $3(\text{Na}_2, \text{Ca})\text{Al}_2\text{Si}_2\text{O}_8 \cdot 1\frac{1}{2}(\text{Na}_2, \text{Ca})\text{CO}_3 \cdot n\text{H}_2\text{O}$, where n varies from 0.75 to 5.4. This formula is in accord with the synthetic experiments of W. Eitel [M.A. 3-3].

L. J. S.

JAKOB (Johann). *Beiträge zur chemischen Konstitution der Glimmer. VIII. Mitteilung: Bisherige Resultate der Muskovitforschung*. Zeits. Krist., 1929, vol. 72, pp. 327-380. [Cf. M.A. 4-205, 3-376, 3-81, 2-423.]

From thirty-five muscovite analyses previously published it is deduced that a muscovite may be considered to be made up of

various proportions of different part-molecules. Five different part-molecules are postulated, but any one muscovite can contain at the most only three different kinds and every combination is not a possible one. In all 461 possible variations are deduced. The chemical unit contains in each case 120SiO_2 , ten times the unit monoclinic cell derived by Mauguin from X-ray measurements. The author draws a parallel to the case of cellulose. Different crystals from the same pegmatite give analyses in close agreement. The variation in constitution of muscovites from different pegmatites is discussed in relation to conditions of crystallization. The author is able to deduce the influence of temperature of formation on chemical constitution and derives a relative temperature-scale. The lithium-rich micas are stated to belong definitely to the muscovite type.

F. A. B.

JOHANSSON (K.). *Vergleichende Untersuchungen an Anthophyllit, Grammatit und Cummingtonit*. Zeits. Krist., 1930, vol. 73, pp. 31-51, 7 figs.

Chemical analyses and optical and X-ray data are given for specimens of these three amphiboles. I, Fresh, colourless crystals of anthophyllite from the copper mine at Falun, Sweden. The X-ray data indicate that the cleavage-prism (110) should be taken as (210). The unit cell contains 32 molecules of molecular weight 105 corresponding to the approximate composition $(\text{Mg},\text{Fe})\text{SiO}_3$. The most probable space-group is V_h^5 . II, Light-green crystals of tremolite from Kaveltorp, Sweden. The unit cell contains four molecules of molecular weight 414 corresponding to the approximate formula $\text{Mg}_3\text{Ca}(\text{SiO}_3)_4$. The space-group is C_{2h}^3 . III, Greenish-brown cleavage fragments of cummingtonite from Uttersvik, near Tunaberg, Sweden. There are four molecules (mol. wt. 459.2) of the type $\text{R}_4(\text{SiO}_3)_4$ in the unit cell, and the space-group is C_{2h}^3 .

	SiO_2 .	Al_2O_3 .	Fe_2O_3 .	FeO .	MnO .	MgO .	CaO .	Na_2O .	K_2O .	H_2O .	F.
I.	55.97	0.59	1.46	15.38	0.48	23.04	0.37	0.11	0.03	2.33	0.45
II.	56.77	1.30	0.67	1.77	0.54	23.31	12.65	0.57	0.23	1.74	0.94
III.	50.74	0.88	1.80	24.13	7.38	10.57	2.00	0.22	0.08	1.94	0.07

III, also TiO_2 0.06 %.

	Sp. gr.	n_a .	n_β .	$n_\gamma(\text{Na})$.	2V.	opt. sign.	Ext. on (010)
I.	3.157	1.6329	1.6384	1.6517	$66^\circ 2'$	+	0.0°
II.	3.025	1.6036	1.6171	1.6299	87 56	—	18.3
III.	3.337	1.6556	1.6718	1.6859	85 20	—	15.4

	a.	b.	c.	a : b : c.	β .	Cleavage-angle.
I.	18.52	18.037	5.27 Å.	1.0267 : 1 : 0.2922	90°	54° 21'
II.	9.83	18.05	5.264	0.5445 : 1 : 0.2916	75° 32'	55 36
III.	9.572	18.22	5.334	0.5255 : 1 : 0.2928	77 52	54 22

F. A. B.

GOßNER (B.). *Zur Frage der Zusammensetzung des Tremolites.* Zeits. Krist., 1930, vol. 73, pp. 114–115.

Points out the resemblance between the formula for tremolite as deduced by Warren from X-ray data [M.A. 4–201] and the 'Bauplan' which the author deduced from chemical analyses [M.A. 2–422].

F. A. B.

ZACHARIASEN (W. H.). *On meliphanite and leucophanite.* Zeits. Krist., 1930, vol. 74, pp. 226–229.

Meliphanite has probably the melilite structure and the composition $(\text{Ca}, \text{Na})_2\text{Be}(\text{Si}, \text{Al})_2(\text{O}, \text{F})_7$. Leucophanite has probably a deformed melilite structure and the composition $(\text{Ca}, \text{Na})_2\text{BeSi}_2(\text{O}, \text{OH}, \text{F})_7$.

H. H.

MACHATSCHKI (Felix). *Die kristallochemischen Beziehungen zwischen Epidot-Zoisit und Orthit-Allanit.* Centr. Min., Abt. A, 1930, pp. 89–96, 154–158. Berichtungen und Zusätze, pp. 317–318.

The general formula for zoisite, epidote, and orthite is written as $\text{X}_2\text{Y}_3\text{Z}_3(\text{O}, \text{OH}, \text{F})_{13}$, when $\text{X} = \text{Ca}, \text{Na}$, rare-earths, Th, Mn, $\text{Y} = \text{Al}$, Mg, Fe, Ti, and $\text{Z} = \text{Si}$ with some Al.

L. J. S.

MACHATSCHKI (Felix). *Die Summenformel der Melilithe.* Centr. Min., Abt. A, 1930, pp. 278–284.

From the analyses tabulated by H. Berman [M.A. 4–204] a general formula for minerals of the melilite group is deduced as $\text{X}_2\text{Y}_2\text{Z}_2(\text{O}, \text{OH})_7$, where $\text{X} = \text{Ca}, \text{Na}$, $\text{Y} = \text{Mg}, \text{Fe}'', \text{Fe}''', \text{Al}$, and $\text{Z} = \text{Si}$ with some Al.

L. J. S.

MACHATSCHKI (Felix). *Die Summenformel des Vesuvians und seine Beziehungen zum Granat.* Centr. Min., Abt. A, 1930, pp. 284–293.

Published analyses of idocrase are calculated to atomic ratios, and a general formula deduced as $\text{X}_{19}\text{Y}_{13}\text{Si}_{18}(\text{O}, \text{OH}, \text{F})_{12}$, i. e. 6 garnet + $\text{CaMg}(\text{OH})_4$. The unit cell contains two such molecules. The unit cell of idocrase has dimensions near to those of garnet, expressing the close relation between these minerals.

L. J. S.

MACHATSCHKI (Felix). *Die Formel des Eukolits*. Centr. Min., Abt. A, 1930, pp. 360-364.

From P. T. Cleve's 1890 analysis of eucolite from Norway the formula is deduced as $X_5Y_2Si_6(O,OH)_{20}$, where $X = Ca, Na, Yt, Ce$, and $Y = Zr, Fe, Mn, Mg, Nb$. Four such molecules are contained in the unit cell of Gossner and Mussegnug [M.A. 4-367]. L. J. S.

MACHATSCHKI (Felix). *Einige Bemerkungen zu der Arbeit von W. Kunitz: Die Mischungsreihen in der Turmalingruppe und die genetischen Beziehungen zwischen Turmalin und Glimmern*. Chem. der Erde, 1930, vol. 4, pp. 455-457.

A criticism of the formula of tourmaline proposed by W. Kunitz [M.A. 4-203]. L. J. S.

KUNITZ (W.). *Über die Formulierung von Silikaten*. Chemie der Erde, 1930, vol. 4, pp. 549-550.

Further discussion on the chemical formula of tourmaline, with comparison of those of the author [M.A. 4-203] and of F. Machatschki [M.A. 4-204]. To conform with the determination that the unit cell contains three molecules, the empirical formula may be multiplied by $3/2$ or $9/4$. L. J. S.

X-rays and Crystal-structure.

BÜSSEM (Wilhelm) & HERRMANN (Karl). *Zwei einfache Erweiterungen des Drehkristallverfahrens*. Zeits. Krist., 1930, vol. 74, pp. 437-457, 18 figs.

The overlapping of spots produced by the diffracted beams from different planes of a rotating crystal is obviated by two new methods. The layer lines produced in the usual rotation photograph by rotating the crystal about a zone-axis are split up by setting the crystal with this zone-axis inclined a few degrees to the axis of rotation. An application of the reciprocal lattice theorem leads to the identification of the indices of the reflecting planes. It is also shown how this method can be used for space-group determination without the necessity of identification of indices; the X-ray study of silver permanganate is cited as an example [M.A. 4-365]. In the second method the cylindrical camera is rotated about its axis with a speed either equal to, or double that of the crystal. Monoclinic and triclinic crystals are more easily dealt with by this procedure,

whilst a combination of the two methods is advantageous for certain cases.

F. A. B.

LINNIK (W.). *Über eine Abänderung der Drehkristallmethode zur Untersuchung der Kristallstruktur mit Röntgenstrahlen.* Zeits. Physik, 1930, vol. 61, pp. 220-226, 7 figs.

The author proposes an ingenious alternative to the Lauegram for obtaining the symmetry of a crystal by X-ray methods. An apparatus is described for rocking the crystal connected rigidly to the photographic plate simultaneously about a horizontal and a vertical axis, both axes intersecting at the crystal. An X-ray beam traversing the crystal during such a motion, so that its direction coincides with a symmetry-axis of the crystal in its mean position, gives a series of hyperbolic traces arranged according to the symmetry of the axis. Copper radiation is used and each diffracting plane produces two traces corresponding to the K_{α} and K_{β} wave-lengths. Reproductions are given of photographs obtained in this way for rock-salt and quartz.

F. A. B.

KRATKY (O.). *Über die Untersuchung von mikroskopischen Kristallen mit Röntgenstrahlen.* Zeits. Krist., 1930, vol. 73, pp. 567-571, 3 figs.

By using a triangular wedge-shaped collimator, a convergent beam of X-rays incident on a small crystal at rest gives rise to a photograph in which layer lines appear as in the ordinary oscillation method. The spacing thus obtained for a gypsum crystal, 0.02 mm. diameter, agrees well with the accepted value. Details of the technique are given and a method outlined using the same collimator for space-group determination.

F. A. B.

LAUE (M. v.). *Notiz zur Dynamik der Randschichten eines Kristalls vom NaCl-Typus.* Annalen Physik, 1930, ser. 5, vol. 4, pp. 1121-1126.

An approximate theoretical explanation, founded on E. Madelung's work (1919), of the identity in the spacing of rock-salt as found by X-ray diffraction methods and the spacing deduced from experiments on the diffraction of electrons. In the latter case only a few net-planes at the surface are involved, whereas the number of net-planes contributing to X-ray diffractions is of the order of a thousand.

F. A. B.

BRILL (Rudolf) & PELZER (H.). *Röntgenographische Teilchengrößenbestimmung. III.* Zeits. Krist., 1930, vol. 74, pp. 147–154, 3 figs.

A more exact relation is calculated connecting the magnitude of the particles of a substance opaque to X-rays and the breadth of the Debye-Scherrer rings [M.A. 4–19, 267]. Thence a series of curves is plotted relating the angle of diffraction with the breadth of the rings for a series of values of particle-size. Samples of nickel contain different sizes of particles according to the sulphur content; measurements of their powder-photographs yield values which lie close to the theoretical curves. Where the opacity condition is not fulfilled the powder is attached to the surface of a lead-glass rod.

F. A. B.

SEKITO (Sinkiti). *On the crystal structure of thallium.* Zeits. Krist., 1930, vol. 74, pp. 189–201, 13 figs.

α -Thallium is stable at ordinary temperatures and has a hexagonal close-packed structure. The unit cell has edges given by $a = 3.450 \text{ \AA.}$, $c/a = 1.600$. β -Thallium is stable above 225°C. ; its structure is face-centred cubic, and the unit cell has an edge of length $4.841 \text{ \AA.}$

H. H.

BURGERS (W. G.) & BASART (J. C. M.). *Gitterkonstanten der Mischkristallreihe Kupfer-Nickel.* Zeits. Krist., 1930, vol. 75, pp. 155–157.

New and accurate measurements were made of the edge of the unit cell of nickel-copper alloys for various percentages of copper. It was found that Vegard's addition-law was not completely satisfied.

H. H.

MACHATSCHKI (Felix). *Röntgenographische Untersuchung des umgeschmolzenen Algodonites und Whitneyites.* Centr. Min., Abt. A, 1929, pp. 371–373.

The hexagonal component Cu_6As changes to hexagonal Cu_3As when algodonite or whitneyite is fused. This explains the earlier observations of Borgström [M.A. 1–258] on polished sections of the minerals before and after fusion. [Cf. M.A. 4–102, 157.] F. A. B.

HÄGG (Gunnar). *Zum Kristallbau des Magnesiumnitrids, Mg_3N_2 .* Zeits. Krist., 1930, vol. 74, pp. 95–99.

The space-lattice of magnesium nitride is space-centred cubic. The unit cell has an edge of length $9.93 \text{ \AA.}$ and contains twelve molecules of Mg_3N_2 .

H. H.

HENDRICKS (Sterling B.) & KOSTING (Peter R.). *The crystal structure of Fe_2P , Fe_2N , Fe_3N and FeB* . Zeits. Krist., 1930, vol. 74, pp. 511-533, 13 figs.

The iron nitride Fe_3N has the space-group D_6^6 ; the unit cell contains two molecules of Fe_3N and has edges given by $a = \sqrt{3} \times 2.695$, $c = 4.362$ Å. The nitride Fe_2N has space-group D_{3d}^1 and the unit cell contains three molecules of Fe_2N . The iron-boron compound FeB has space-group V_h^{16} ; the unit cell contains four molecules of FeB , and has edges given by $a = 4.053$, $b = 5.495$, $c = 2.946$ Å. The iron-phosphorus compound Fe_2P has the space-group D_{3h}^3 ; the unit cell contains three molecules of Fe_2P , and has edges given by $a = 5.852$, $c = 3.453$ Å.

H. H.

HENDRICKS (Sterling B.). *The crystal structure of cementite*. Zeits. Krist., 1930, vol. 74, pp. 534-545, 3 figs.

Cementite has the space-group V_h^{16} with a unit cell containing four molecules of Fe_3C and having edges given by $a = 4.518$, $b = 5.069$, $c = 6.736$ Å.

H. H.

MÖLLER (H.). *Das Krystallgitter des Eisensilicides $FeSi$* . Die Naturwissenschaften, 1930, vol. 18, pp. 734-735.

Iron silicide, sp. gr. 6.23, prepared by fusing together iron and silicon, gave by the X-ray powder method a unit cube of edge $a = 4.467$ Å., containing four molecules $FeSi$. The space-group is T^4 . The smallest atomic distances are Fe-Fe 2.74, Si-Si 2.76, Fe-Si 2.24, 2.34, 2.52 Å.

L. J. S.

NATTA (G.). *La struttura cristallina dell'idrogeno solforato e dell'idrogeno seleniato*. Atti (Rend.) R. Accad. Lincei, Cl. Sci. fis. mat. nat. Roma, 1930, ser. 6, vol. 11, pp. 749-754, 1 fig.

X-ray powder photographs of hydrogen sulphide and hydrogen selenide at -170°C ., show that the crystals are cubic with the fluorite type of structure and space-group O_h^5 . The edges of the unit cubes containing four molecules of H_2S and H_2Se are 5.778 and 6.020 Å. respectively; and the calculated densities 1.166 and 2.456.

L. J. S.

PAULING (Linus) & HOARD (J. L.). *The crystal structure of cadmium chloride*. Zeits. Krist., 1930, vol. 74, pp. 546-551, 2 figs.

The unit cell of cadmium chloride is a rhombohedron with edge 6.23 Å. and angle $36^\circ 2'$ containing one molecule of $CdCl_2$. The

cadmium atom is at (0,0,0) and the chlorine atoms at (u,u,u) and ($\bar{u},\bar{u},\bar{u}$), where $u = 0.25 \pm 0.01$. H. H.

WOOSTER (Nora). *The structure of chromium trichloride CrCl₃*. Zeits. Krist., 1930, vol. 74, pp. 363-374, 2 figs.

Chromium trichloride has the space-group D_3^3 or D_3^5 . The unit cell contains six molecules of CrCl₃ and has edges given approximately by $a = 6.016$, $c = 17.3 \text{ \AA}$. H. H.

HASSEL (O.) & NILSSEN (Sigurd). *Der Kristallbau des BiF₃*. Zeits. Anorg. Chem., 1929, vol. 181, pp. 172-176.

Pure analysed BiF₃ was studied by the X-ray powder method. The unit cube of side $a = 5.853 \text{ \AA}$. contains four molecules. It is assumed that it is a face-centred structure, with Bi at 4b and F at 4c and 8e of Wyckoff. There are then two distances Bi-F, 2.53 and 2.93 $\text{\AA}$. The calculated density is 8.75, and measured 8.3-8.4.

M. H. H.

BRÆKKEN (H.). *Die Kristallstruktur der Trijodide von Arsen, Antimon und Wismut*. Zeits. Krist., 1930, vol. 74, pp. 67-72, 2 figs.

Bismuth iodide has the space-group C_3^1 . The unit cell contains six molecules of BiI₃ with edges given by $a = 7.498$, $c = 20.676 \text{ \AA}$. Similar structures are possessed by AsI₃, for which $a = 7.187$, $c = 21.394 \text{ \AA}$, and by SbI₃, for which $a = 7.466$, $c = 20.892 \text{ \AA}$.

H. H.

MENZER (G.). *Über die Kristallstruktur des Kryolith*. Fortschr. Min. Krist. Petr., 1929, vol. 13, pp. 56-57; Centr. Min., Abt. A, 1928, pp. 378-379.

A monoclinic crystal of cryolite from Greenland gave by the rotation method a unit cell of dimensions $a = 5.392$, $b = 5.594$, $c = 7.764 \text{ \AA}$. ($a:b:c = 0.964:1:1.388$), containing two molecules Na₃AlF₆. The space-group is C_{2h}^1 or C_{2h}^2 . The positions of the atoms could not be determined from the intensities of the X-ray spectra; but they are worked out from a consideration of the atomic radii.

L. J. S.

MENZER (G.). *Die Gitterkonstante des Ammoniumkryoliths*. Zeits. Krist., 1930, vol. 73, p. 113.

Pauling's measurements of the cell-dimensions of ammonium fluo-aluminate (NH₄)₃AlF₆ were repeated [M.A. 2-514]. The powder method gives $a = 8.904 \text{ \AA}$. The density is 1.78. The unit cell

contains four molecules $(\text{NH}_4)_3\text{AlF}_6$; thence the calculated density = 1.837. Two chemical analyses are given. F. A. B.

PAULING (Linus). *Note on the lattice constant of ammonium hexafluoroaluminate.* Zeits. Krist., 1930, vol. 74, pp. 104–105.

The edge of the unit cell of $(\text{NH}_4)_3\text{AlF}_6$ is 8.904 Å., not 8.40 Å. as previously stated [M.A. 2–514]. H. H.

HOCART (R.). *Sur la détermination des paramètres de la boléite, de la pseudoboléite et de la cumengéite, au moyen des rayons X.* Zeits. Krist., 1930, vol. 74, pp. 20–24, 3 figs.

Boleite, pseudoboleite, and cumengeite have tetragonal structures. The unit cell of boleite contains twelve molecules of $9\text{PbCl}_2 \cdot 8\text{CuO} \cdot 3\text{AgCl} \cdot 9\text{H}_2\text{O}$ and has $a = 15.4$, $c = 62$ Å. The cell of pseudoboleite contains twelve molecules of $5\text{PbCl}_2 \cdot 4\text{CuO} \cdot 6\text{H}_2\text{O}$ and has $a = 15.4$, $c = 31.2$ Å. The cell of cumengeite contains ten molecules of $4\text{PbCl}_2 \cdot 4\text{CuO} \cdot 5\text{H}_2\text{O}$ and has $a = 14.9$, $c = 24.15$ Å. [Cf. M.A. 4–272.]

H. H.

HOLGERSSON (Sven). *Röntgenographische Untersuchungen einiger synthetisch dargestellten Chromspinnelle.* Zeits. Anorg. Chem., 1930, vol. 192, pp. 123–128.

Magnesium chromite, MgCr_2O_4 , as an artificially prepared crystalline powder has a unit cube of edge $a = 8.32$ Å. containing eight molecules. Cadmium chromite, CdCr_2O_4 , has $a = 8.60$ Å.

L. J. S.

HOLGERSSON (Sven) & KARLSSON (Aldo). *Über einige neue Kobaltite vom Spineltypus.* Zeits. Anorg. Chem., 1929, vol. 183, pp. 384–394, 6 figs.

The authors have prepared a number of spinels in which the trivalent element is cobalt by heating mixtures of cobalt nitrate and various divalent metal nitrates at 800–850° C. Debyeograms of the products showed no lines referable to the monoxides, but only the lines expected for the spinels. The compounds prepared, with their measured cell-sides and calculated densities were: CuCo_2O_4 , $a = 8.039$ Å., sp. gr. 6.28; MgCo_2O_4 , $a = 8.107$ Å., sp. gr. 4.96; ZnCo_2O_4 , $a = 8.108$ Å., sp. gr. 5.94; MnCo_2O_4 , $a = 8.268$ Å.; NiCo_2O_4 , $a = 8.112$ Å. The last only is strongly ferromagnetic. Co_3O_4 , prepared from cobalt nitrate by gentle ignition, gave $a = 8.108$ Å. Attempts to prepare spinels with nickel as trivalent element failed.

M. H. H.

POSNJAK (E.). *The crystal structure of magnesium, zinc and cadmium ferrites.* Amer. Journ. Sci., 1930, ser. 5, vol. 19, pp. 67-70.

The ferrites were prepared by heating at 800° C., the carbonates of Mg, Zn, Cd with ferric oxide. Only MgFe_2O_4 is ferromagnetic. X-ray powder photographs gave the following cell dimensions containing eight molecules of the spinel type.

		<i>a.</i>	<i>d</i> (obs.).	<i>d</i> (calc.).	<i>n</i> _{Li.}
MgFe_2O_4	...	8.36 Å.	4.481	4.518	2.34
ZnFe_2O_4	...	8.41	5.290	5.349	2.31
CdFe_2O_4	...	8.67	5.764	5.835	2.39

L. J. S.

PAULING (Linus) & SHAPPELL (M. D.). *The crystal structure of bixbyite and the C-modification of the sesquioxides.* Zeits. Krist., 1930, vol. 75, pp. 128-142, 6 figs.

The space-group of bixbyite from Utah is T_h^7 . The unit cell contains sixteen molecules of $(\text{Mn,Fe})_2\text{O}_3$ and has an edge of 9.365 Å. Similar data are given for other sesquioxides.

H. H.

STEELE (F. A.) & DAVEY (Wheeler P.). *Die Struktur des Trikalzium-Aluminates.* Zeits. Krist., 1930, vol. 73, pp. 17-30, 1 fig.

Optically isotropic calcium aluminate, $3\text{CaO} \cdot \text{Al}_2\text{O}_3$, was prepared by fusing together requisite proportions of pure lime and alumina. The X-ray powder method gives for the cubic cell-edge $a = 7.624$ Å.; the density lies between 2.94 and 3.07. Thus the unit cell contains three molecules $3\text{CaO} \cdot \text{Al}_2\text{O}_3$. A probable structure is deduced from consideration of ionic radii and line intensities on the powder photographs. The authors consider that this structure illustrates a new 'mixed ion' type simply built from the Ca, Al, and O ions as units. None of the familiar ionic groups CaO , Al_2O_3 , &c., appears to be present, and the structure is described as a system of right-angled honeycomb cells constructed from Al and O ions, the holes being filled with Ca and the remaining O atoms.

F. A. B.

GOßNER (B.) & MUßGNUG (F.). *Beitrag zur Kenntnis des Barytocalcites und seiner strukturellen Beziehungen zu anderen Stoffen.* Centr. Min., Abt. A, 1930, pp. 321-328.

Barytocalcite (sp. gr. 3.689) has a unit cell of dimensions $a = 8.15$, $b = 5.22$, $c = 6.58$ ($a:b:c = 1.561:1:1.2605$, $\beta = 83^\circ 52'$) containing two molecules CaBaC_2O_6 . The space-group is C_2^2 . These cell dimensions are compared with those of sodium nitrate, calcite, dolomite, and baryte.

L. J. S.

GOßNER (Balthasar) & MUßGNUG (Franz). *Über Alstonit und Milarit. Ein Beitrag zur Kenntnis komplex gebauter Kristalle.* Centr. Min., Abt. A, 1930, pp. 220–238, 8 figs.

X-ray photographs of alstonite (sp. gr. 3·707–3·715) give a unit cell of dimensions $a = 8·77$, $b = 4·99$, $c = 6·11$ Å. ($a:b:c = 1·757:1:1·224$) containing two molecules CaBaC_2O_6 . The X-ray data suggest that the mineral is a double salt rather than an isomorphous mixture of aragonite and witherite. The twinning and pseudosymmetry of aragonite, witherite, and alstonite are discussed. Milarite gives X-ray data conforming with hexagonal symmetry and the space-group D_{6h}^2 . The unit cell of dimensions $a = 10·46$, $c = 13·90$ Å. ($c/a = 1·329$) contains two molecules $(\text{Si}_2\text{O}_5)_6\text{Al}_2\text{Ca}_2\text{KH}$. The crystals show optical anomalies with a division into orthorhombic sectors [M.A. 3–451], but the pseudosymmetry is here of a higher order than in alstonite.

L. J. S.

HOFMANN (Wilhelm). *Beiträge zum Feinbau der Tuttonschen Salze. I. Die Raumgruppe.* Zeits. Krist., 1930, vol. 75, pp. 158–159.

The space-groups of the isomorphous series of ammonium-magnesium, ammonium-iron, ammonium-zinc sulphates is C_{2h}^5 . The edges a , b , c of the unit cell and the angle β are respectively $9·28$, $12·57$, $6·20$, $82^\circ 54'$ for $(\text{NH}_4)_2\text{Mg}(\text{SO}_4)_2·6\text{H}_2\text{O}$; $9·28$, $12·58$, $6·22$, $83^\circ 10'$ for $(\text{NH}_4)_2\text{Fe}(\text{SO}_4)_2·6\text{H}_2\text{O}$; and $9·20$, $12·47$, $6·23$, $83^\circ 8'$ for $(\text{NH}_4)_2\text{Zn}(\text{SO}_4)_2·6\text{H}_2\text{O}$.

H. H.

BÜSSEM (Wilhelm) & HERRMANN (Karl). *Strukturuntersuchung des Silberpermanganats.* Zeits. Krist., 1930, vol. 74, pp. 458–468, 3 figs.

Silver permanganate was found to form monoclinic crystals with $a:b:c = 0·679:1:0·869$, $\beta = 87^\circ 30'$ disagreeing with Mitscherlich, who probably made an error in calculation. The unit cell contains four molecules of AgMnO_4 and has edges given by $a = 5·66$, $b = 8·27$, $c = 7·12$ Å. The space-group is C_{2h}^5 .

H. H.

HERRMANN (K.) & ILGE (W.). *Röntgenographische Strukturermorschung der kubischen Modifikation der Perchlorate.* Zeits. Krist., 1930, vol. 75, pp. 41–66, 9 figs.

The perchlorates of K, NH_4 , Tl, Rb, Cs, Na, Ag pass into cubic modifications at temperatures above $299·5$, 240 , 266 , 279 , 219 , 308 , 155 – 159°C . respectively. The space-group of this cubic modification is T_d^2 or T^2 , and the unit cell contains four molecules of KClO_4 , &c.,

and has an edge of 7.47, 7.63, 7.61, 7.65, 7.96, 7.25, 6.92 Å. respectively. H. H.

WEST (J.). *A quantitative X-ray analysis of the structure of potassium dihydrogen phosphate (KH₂PO₄)*. Zeits. Krist., 1930, vol. 74, pp. 306–332, 9 figs.

The space-group of potassium dihydrogen phosphate is V_d^{12} . The unit cell contains four molecules of KH₂PO₄ and has edges given by $a = 7.43$, $c = 6.97$ Å. The positions of the atoms were investigated by double Fourier analysis; each potassium atom is equidistant from eight neighbouring oxygen atoms, and the shape of the PO₄ group is approximately regular. H. H.

STURDIVANT (J. H.). *The crystal structure of columbite*. Zeits. Krist., 1930, vol. 75, pp. 88–108, 6 figs.

The space-group of a crystal of (Fe,Mn)(Nb,Ta)₂O₆, containing principally columbite, was found to be V_h^{14} . The unit cell contained four molecules and had edges given by $a = 5.082$, $b = 14.238$, $c = 5.730$ Å. H. H.

BROWNMILLER (L. T.) & BOGUE (R. H.). *The X-ray method applied to a study of the constitution of portland cement*. Amer. Journ. Sci., 1930, ser. 5, vol. 20, pp. 241–264, 3 figs.

A comparison of the X-ray powder photographs of the products obtained in the system CaO–Al₂O₃–SiO₂ [M.A. 1–320] with those of portland cement clinker shows that portland cement consists mainly of 3CaO.SiO₂ and β -2CaO.SiO₂ usually also with some 3CaO.Al₂O₃, 4CaO.Al₂O₃.Fe₂O₃, and MgO. The supposed 8CaO.Al₂O₃.2SiO₂ ('alite' or 'janeckite') is a mixture of the first three of these compounds.

L. J. S.

GOßNER (B.) & MUßGNUG (F.). *Über die strukturelle und molekulare Einheit von Petalit*. Zeits. Krist., 1930, vol. 74, pp. 62–66.

Petalite has the space-group C_{2h}^6 and a unit cell containing four molecules of 3SiO₂.SiO₄AlLi, whose dimensions are given by $a = 11.77$, $b = 5.13$, $c = 15.17$ Å., $\beta = 67^\circ 16'$. H. H.

WARREN (B. E.) & MODELL (D. I.). *The structure of enstatite MgSiO₃*. Zeits. Krist., 1930, vol. 75, pp. 1–14, 5 figs.

The space-group of enstatite is V_h^{15} , and the unit cell contains 16 molecules of (Mg,Fe)SiO₃ having edges given by $a = 18.20$, $b = 8.86$,

$c = 5.20 \text{ \AA}$. This structure supports the view that the orthorhombic pyroxenes are to be regarded as true members of the pyroxene group.
H. H.

PAULING (Linus). *The structure of sodalite and helvite*. Zeits. Krist., 1930, vol. 74, pp. 213–225, 4 figs.

Sodalite and helvite have probably the space-group T_d^4 . The former has a unit cell of edge $8.87 \text{ \AA}$. containing two molecules of $\text{Na}_4\text{Al}_3\text{Si}_3\text{O}_{12}\text{Cl}$. The latter has a unit cell of edge $8.25 \text{ \AA}$. containing two molecules of $(\text{Mn,Fe})_4\text{Be}_3\text{Si}_3\text{O}_{12}\text{S}$.
H. H.

WARREN (B. E.). *The structure of melilite* $(\text{Ca,Na})_2(\text{Mg,Al})_1(\text{Si,Al})_2\text{O}_7$. Zeits. Krist., 1930, vol. 74, pp. 131–138, 2 figs.

The space-group of melilite is D_{2d}^3 . The unit cell contains two molecules of $(\text{Ca,Na})_2(\text{Mg,Al})(\text{Si,Al})_2\text{O}_7$ and has edges given by $a = 7.73$, $c = 5.01 \text{ \AA}$.
H. H.

ZACHARIASEN (W. H.). *The crystal structure of benitoite*, $\text{BaTiSi}_3\text{O}_9$. Zeits. Krist., 1930, vol. 74, pp. 139–146, 2 figs.

The space-group of benitoite is D_{3h}^3 . The unit cell has edges given by $a = 6.60$, $c = 9.71 \text{ \AA}$. and contains two molecules of $\text{BaTiSi}_3\text{O}_9$.
H. H.

GOßNER (B.) & MUßGNUG (F.). *Über die strukturelle und molekulare Einheit von Eudialyt*. Centr. Min., Abt. A, 1930, pp. 81–88, 1 fig.

ZACHARIASEN (William H.). *Bemerkungen zu der Arbeit B. Goßner und F. Mußgnug: Über die strukturelle und molekulare Einheit von Eudialyt*. Ibid., pp. 315–317.

X-ray rotation and Laue photographs of a crystal of eudialyte from Nauyasak, Greenland, gave a rhombohedral cell of edge $a = 13.01 \text{ \AA}$. and axial angle $66^\circ 44'$. The space-group is D_{3d}^5 . Splinters from the crystal had density ranging from 2.826 to 2.888, and they show differences in optical character, being isotropic or weakly birefringent with blue-violet interference-colours; the material is therefore presumably variable in chemical composition. Combined with a density 2.929 and J. Lorenzen's (1882) analysis for eudialyte from Kangerdluarsuk, Greenland, the X-ray data do not give a whole number of molecules in the unit cell for any of the seven alternative formula that are tried. W. H. Zachariasen from later analyses suggests a formula $\text{R}_7\text{Si}_6\text{X}_{19}$ (where $\text{X} = \text{O, OH, Cl}$) or

$(\text{Na,Ca,Fe})_6\text{ZrSi}_6\text{O}_{18}(\text{OH,Cl})$, for which there would be 4.13 molecules in the unit cell.

L. J. S.

PAULING (Linus). *The structure of the micas and related minerals.*

Proc. Nat. Acad. Sci. U.S.A., 1930, vol. 16, pp. 123-129, 5 figs.

Oscillation and Laue photographs of fuchsite give results which agree closely with the size and shape of the unit cell of muscovite as found by Mauguin [M.A. 4-32, 33]. The author finds for fuchsite $a = 5.19$, $b = 8.99$, $c = 20.14 \text{ \AA.}$, and $\beta = 84^\circ$. For the monoclinic cell of hydrargillite, which is also pseudohexagonal, the cell-edges are found to be $a = 8.70$, $b = 5.09$, $c = 9.76 \text{ \AA.}$, with $\beta = 85^\circ 29'$. The suggested structure of the latter compound consists of layers of octahedra, each consisting of 6OH ions grouped round an Al ion, and each octahedron sharing three edges. The a and b dimensions for the fuchsite cell approach closely those for hydrargillite and also the hexagonal layers in β -tridymite and β -cristobalite. From a consideration of the structures of these three compounds and brucite, structures are suggested for pyrophyllite, talc, muscovite, biotite, and the brittle micas. Layers of linked tetrahedra of Si and O and of Al and O forming an hexagonal pattern are the essential features of these structures. The layers are electrically neutral for talc and pyrophyllite, and are supposed to be held together by stray electrical forces; the layers in muscovite and biotite are joined through univalent potassium ions and in the brittle micas by divalent calcium atoms. It is significant that in passing in this order from talc to the brittle micas the hardness increases and the properties of the cleavage-flakes range from complete flexibility to the brittle state. Calculated intensities of various orders of X-ray reflections from the (001) plane of fuchsite agree well with observed values. The structure leads to a general formula representing the wide range of variation in composition of mica; this is $\text{KX}_n\text{Y}_4\text{O}_{10}(\text{OH,F})_2$ with $2 \leq n \leq 3$ in which X represents cations of co-ordination number 6 (Al, Mg, Fe, Mn, Ti, Li, &c.) and Y cations of co-ordination number 4 (Si, Al, &c.). K can be partially replaced by Na and possibly to some extent by Ca. The general formula for the brittle micas is similarly $\text{CaX}_n\text{Y}_4\text{O}_{10}(\text{OH,F})_2$.

F. A. B.

SCHIEBOLD (E.). *Zur Struktur von Nephelin und Analcim.* Die Naturwissenschaften, 1930, vol. 18, pp. 705-706.

Nepheline from Parco Chigi, Lazio [M.A. 1-108], gave a unit cell, $a = 10.1$, $c = 8.51 \text{ \AA.}$, containing eight molecules NaAlSiO_4 , and

space-group C_6^6 [cf. M.A. 3-344]. The structure is not close-packed hexagonal, but shows a close resemblance to that of tridymite, with $[\text{SiO}_4]$ and $[\text{AlO}_4]$ groups; this explaining the usual excess of silica in nepheline. Analcime is tetragonal, space-group D_{4h}^{20} , also with $[\text{SiO}_4]$ and $[\text{AlO}_4]$ groups and sodium atoms between. The loosely-held water occupies a definite place in the structure. L. J. S.

HARTWIG (W.). *Über die Struktur von Analcim*. Fortschr. Min. Krist. Petr., 1929, vol. 13, pp. 38-39; Centr. Min., Abt. A, 1928, p. 380.

HARTWIG (Wilhelm). *Zur Strukturbestimmung des Analcims*. Die Naturwissenschaften, 1930, vol. 18, p. 601.

Water-clear crystals of analcime from the Cyclopean Islands, with sp. gr. 2.267 and agreeing with the formula $\text{NaAlSi}_2\text{O}_6 \cdot \text{H}_2\text{O}$, gave a unit cube of edge $a = 13.68 \text{ \AA}$. containing sixteen molecules, and space-group O_h^{10} . In the second note various alternative positions for the atoms are suggested. L. J. S.

TAYLOR (W. H.). *The structure of analcite* ($\text{NaAlSi}_2\text{O}_6 \cdot \text{H}_2\text{O}$). Zeits. Krist., 1930, vol. 74, pp. 1-19, 3 figs.

The statement of other authors is confirmed that analcime has the space-group O_h^{10} and a unit cell of edge $13.7 \text{ \AA}$. containing sixteen molecules of $\text{NaAlSi}_2\text{O}_6 \cdot \text{H}_2\text{O}$. The arrangement of the atoms in the cell is worked out on the assumption that the zeolites are silica-like but with part of the silicon replaced by aluminium, the spare valency thus introduced being satisfied by Na, K, Ca, Ba, &c.

H. H.

WYART [J.]. *Étude de la heulandite au moyen des rayons X*. Compt. Rend. Acad. Sci. Paris, 1930, vol. 190, pp. 1564-1566.

Rotation and Laue photographs of heulandite from Teigarhorn, Beruffjord, gave $a = 7.45$, $b = 17.80$, $c = 15.85 \text{ \AA}$. The true parametral plane is not that usually accepted, the true axial ratio being $a:b:c = 0.418:1:0.890$. Assuming that heulandite is holohedral, the space-group is C_{2h}^3 . Published analyses are recalculated to give the cell-content in atoms of each element, and it is found that there are thirty-six atoms of oxygen per unit cell (excluding the oxygen of the water). This corresponds to a very open structure. The other atoms are present in variable and non-integral numbers. The laws of the atomic replacements involved cannot be ascertained.

M. H. H.

PARSONS (A. L.). *Lattice dimensions of heulandite from Wasson's Bluff, Nova Scotia*. Univ. Toronto Studies, Geol. Ser., 1930, no. 29, pp. 37-38.

Heulandite gave by the oscillating crystal X-ray method a unit cell of dimensions $a = 7.5438$, $b = 17.969$, $c = 15.913 \text{ \AA}$. ($a:b:c = 0.4198:1:0.88564$, $\beta = 83^\circ 34\frac{1}{2}'$) containing 4.771 molecules $\text{H}_4\text{CaAl}_2\text{Si}_6\text{O}_{18} \cdot 3\text{H}_2\text{O}$. This formula, however, does not agree with analyses of heulandite from Nova Scotia [M.A. 2-55], and a recalculation gives in the unit cell 1.0113 of the more complex group $4(\text{H}_4\text{CaAl}_2\text{Si}_6\text{O}_{18} \cdot 3\text{H}_2\text{O}) + 1(\text{H}_8\text{CaAl}_2\text{Si}_4\text{O}_{16} \cdot \text{H}_2\text{O})$. Such an isomorphous mixture of a metasilicate and an orthosilicate in heulandite is perhaps the cause of the frequent curvature of the crystals.

L. J. S.

PARSONS (A. L.). *The lattice dimensions of natrolite from Wasson's Bluff, Nova Scotia*. Univ. Toronto Studies, Geol. Ser., 1930, no. 29, pp. 35-36.

Natrolite (sp. gr. 2.257) gave by the oscillating crystal X-ray method a unit cell of dimensions $a = 18.306$, $b = 18.708$, $c = 6.6814 \text{ \AA}$. ($a:b:c = 0.9785:1:0.3572$) containing 8.2375 molecules $\text{Na}_2\text{Al}_2\text{Si}_3\text{O}_{10} \cdot 2\text{H}_2\text{O}$. Taking the axial ratios, $a:b:c = 0.9785:1:0.3536$, of Brögger, the calculated number of molecules is 8.0934. L. J. S.

WYCKOFF (Ralph W. G.). *X-ray diffraction data from several mono-alkyl substituted ammonium iodides*. Zeits. Krist. 1930, vol. 74, pp. 25-28.

Spectral reflections with copper and molybdenum radiation were obtained for crystals of the series $\text{NH}_3\text{C}_r\text{H}_{2r+1}\text{I}$ with $r = 4, 5, 6, \dots, 12$.

H. H.

BREDIG (M. A.). *Die Raumgruppe des 2, 4, 6-Tribrombenzonitrils*. Zeits. Krist., 1930, vol. 74, pp. 56-61, 3 figs.

2, 4, 6-tribrombenzonitrile has the space-group C_{2h}^2 , and a unit cell containing two molecules of $\text{C}_6\text{H}_2\text{Br}_3\text{CN}$ with dimensions given by $a = 12.50$, $b = 10.30$, $c = 4.87 \text{ \AA}$, $\beta = 44^\circ 24'$. H. H.

HENDRICKS (Sterling B.). *The crystal structure of primary amyl ammonium chloride*. Zeits. Krist., 1930, vol. 74, pp. 29-40, 7 figs.

The structure of primary amyl ammonium chloride was re-examined in order to clear up a doubt as to whether the carbon atoms of the hydrocarbon group have a collinear or a zigzag arrange-

ment. The new experiments indicate that the departure from a straight line does not exceed $0.2 \text{ \AA}$. H. H.

BREDIG (M.A.). *Über den Kristallbau des Pentaerythritetraformiats*. Zeits. Krist., 1930, vol. 74, pp. 49–55, 4 figs.

Pentaerythrite tetraformate has the space-group V_h^{15} . The unit cell contains eight molecules of $C_9H_{12}O_8$ and has edges given by $a = 19.80$, $b = 9.90$, $c = 11.70 \text{ \AA}$. H. H.

BRÜCKL (K.). *Kristallographische Untersuchung über Harmin (Banisterin)*. Zeits. Krist., 1930, vol. 74, pp. 202–204, 1 fig.

Banisterine is identical with harmine. Its crystalline form is holohedral orthorhombic, and the crystallographic axial ratios are given by $a:b:c = 1.9669:1:0.5957$. The unit cell has edges given by $a = 19.22$, $b = 9.57$, $c = 5.78 \text{ \AA}$. and contains four molecules of $C_{13}H_{12}ON_2$. H. H.

GLAMANN (P. W.), HERRMANN (K.), & KRUMMACHER (A. H.). *Röntgenuntersuchungen an kristallin-flüssigen Substanzen. I. Para-Azoxyanisol*. Zeits. Krist., 1930, vol. 74, pp. 73–94, 18 figs.

W. Kast's work (1927) on the X-ray diffraction rings of liquid crystals subjected to a magnetic field is repeated and developed. Photographs of *p*-azoxyanisole in the crystal and amorphous states are obtained with and without the application of a magnetic field (maximum 10,000 gauss) using in turn copper, iron, and molybdenum radiation. Two diffraction rings are observed and a third in the case of molybdenum radiation. These rings have the same diameter with and without a magnetic field, but in the liquid-crystal state the magnetic field splits each of the rings into two crescents, the direction of split being transverse to the magnetic field for all the rings except the third observed with molybdenum radiation. The diameter of the rings varies with change of temperature. The angle of diffraction of the largest ring corresponds to a spacing related to one dimension of the *p*-azoxyanisole molecule. The other rings are not obviously related to molecular dimensions. F. A. B.

Zeolites.

ZOCH (Ilse). *Über den Basenaustausch kristallisierter Zeolithe gegen neutrale Salzlösungen*. Chemie der Erde, 1915, vol. 1, pp. 219–269, 5 figs.

A study of the base-exchange reactions of zeolites. Stilbite from Beruffjord was mainly used, and the influence of varying temperature

and concentration of the exchanging salt (ammonium chloride) studied. Cleavage-flakes of ammonium-stilbite are practically isotropic, but when treated with caustic alkali ammonia is expelled and the birefringence returns. Silver and copper do not affect the birefringence, but the latter gives a blue-green compound. The stilbite was analysed by Gilbert, after being kept over 5 % H_2SO_4 : SiO_2 55.65, Al_2O_3 16.70, CaO 7.10, Na_2O 1.15, K_2O 0.45, H_2O 19.95 %.

M. H. H.

RINNE (F.). *Zur zeolithischen Wasserbindung*. Ber. Sächs. Akad. Wiss. Leipzig, Math.-phys. Kl., 1920, vol. 72, pp. 12-23, 10 figs.

When heulandite is dehydrated, the optic axial plane rotates about the symmetry-axis, at first very rapidly, becoming nearly parallel to [102] at about 100°C., then moving very slowly till it is almost perfectly parallel to [102] at about 200°C., after which it moves gradually away again. At 300°C. it is almost parallel to [101]. The action of strong sulphuric acid is similar to that of a temperature of 200°C. The water content is three molecules at 200°C. and one molecule at 300°C. The water is regarded as in solid solution in the anhydrous silicate, and the dehydration is considered continuous, the tri- and monohydrates being marked by notable slowness of dehydration or hydration as well as by pseudorhombic optical properties. Heulandite is compared morphologically with sanidine, and shown to be remarkably similarly developed in the ortho-zone, while if the crystals are set up so as to develop this resemblance by interchange of the a and c axes of heulandite, $(\bar{1}01)$ remaining $(\bar{1}01)$, the b -axes are as $1\frac{1}{2}$ (sanidine) to 2 (heulandite). Lauegrams of sanidine, heulandite, and dehydrated (meta-)heulandite show a resemblance.

M. H. H.

SCHEUMANN (K. H.). *Über den Wassergehalt des Heulandits*. Ber. Sächs. Akad. Wiss. Leipzig, Math.-phys. Kl., 1921, vol. 73, pp. 3-113, 19 figs.

The perfect continuity of the dehydration curve of heulandite is proved. If the dehydration exceeds half the total water there is a shrinkage of the structure leading to partial irreversibility, and on rehydration there are marked checks in the velocity at the integral molecular proportions of water. The hexahydrate $(\text{Ca}_2\text{Al}_4\text{Si}_{12}\text{O}_{32} \cdot 6\text{H}_2\text{O})$ may probably be considered a definite compound, and perhaps also the dihydrate.

M. H. H.

SEELIGER (R.) (with LAPKAMP (K.)). *Über Absorption von Gasen durch Kristalle*. Physikal. Zeits., 1921, vol. 22, pp. 563-568, 3 figs.

A study of the absorption of gases by dehydrated chabazite. Nitric oxide and ammonia are absorbed much more strongly than any others, and cannot be pumped off again without heating as other gases can. M. H. H.

WEIGEL (O.). *Eigenschaften und Entstehung der Zeolithe*. Sitzungsber. Gesell. Naturwiss. Marburg, 1924, pp. 107-135, 2 figs. [Cf. M.A. 2-57].

It is assumed that in the formation of a zeolite the solvent (water) remains in the interstices of the silicate lattice without participating in its structure; but the atoms of the lattice lose energy necessary to overcome the internal pressure of the solvent as the lattice is laid down. Dehydration frees this energy, and it can effect the absorption of water or other substances. The ready base-exchange is due to the weakened linkings of the silicate lattice. A formula is developed connecting the temperature, quantity absorbed, and equilibrium-pressure of the substance absorbed, with the van der Waals constants of the substance absorbed and of water, and a constant characteristic of the zeolite. This constant is interpreted as the volume available for absorption. M. H. H.

[LABUNTZOV (A. N.)] Лабунцов (А. Н.). Цеолиты Хибинских и Ловозерских Тундр.—LABUNCOV (A.) (LABOUNTZOW (A.)). *Les zéolithes des Monts Chibines et Lujawrurt en Laponie russe*. Труды Мин. Музея Акад. Наук СССР (Trav. Musée Min. Acad. Sci. URSS), 1927, vol. 2, pp. 91-100.

Zeolites found in the Khibinsky and Lovozersky tundras, Kola, include natrolite [M.A. 3-307], analcime, chabazite, heulandite, and mesolite. The last four are now described, with particulars of their localities and paragenesis. Analcime is always associated with aegirine, and may be either primary (epimagmatic) or secondary after sodalite or aegirine. The following equations are suggested: $2(3\text{Na}_2\text{Al}_2\text{Si}_2\text{O}_8 \cdot 2\text{NaCl})$ (sodalite) + $n\text{H}_2\text{O} = 3(\text{Na}_2\text{Al}_2\text{Si}_4\text{O}_{12} \cdot 2\text{H}_2\text{O})$ (analcime) + $3(\text{Al}_2\text{O}_3 \cdot n\text{H}_2\text{O}) + 4\text{NaCl} + 6\text{NaOH}$. Earthy white masses of aluminium hydroxide are found. From aegirine of the second generation: $n[\text{Na}_2(\text{Fe}, \text{Al})_2\text{Si}_4\text{O}_{12}]$ (aegirine II) + $2\text{H}_2\text{O} = n - 1(\text{Na}_2\text{Fe}_2\text{Si}_4\text{O}_{12})$ (aegirine III) + $\text{Na}_2\text{Al}_2\text{Si}_4\text{O}_{12} \cdot 2\text{H}_2\text{O}$ (analcime), or $\text{Na}_2\text{Fe}_2\text{Si}_4\text{O}_{12}$

(aegirine II) + $\text{Al}_2\text{O}_3 \cdot n\text{H}_2\text{O}$ + $2\text{H}_2\text{O}$ = $\text{Na}_2\text{Al}_2\text{Si}_4\text{O}_{12} \cdot 2\text{H}_2\text{O}$ (analcime) + $\text{Fe}_2\text{O}_3 \cdot n\text{H}_2\text{O}$. Heulandite was found only once as well-developed crystals (*c b t s m*). P. N. C.

MAURITZ (Béla). *Phillipsit a Balatonfelvidéki bazaltokból.*—*Phillipsit aus den Basalten des Balaton-Oberlandes.* Mat. Természett. Értesítő, Magyar Tudom. Akad. Budapest, 1929, vol. 46, pp. 657–661 (Hung.), p. 662 (Germ.), 1 pl., 2 text-figs.

Two new occurrences of phillipsite are noted from basalt quarries in the Balaton highlands. From Sümeg as 8 mm. intercrossing twins. From Mt. Halyagos as: (1) minute (0.2 mm.) crystals; (2) 1 mm. intercrossing twins; (3) 2 mm. twinned crystals resembling rhombic-dodecahedra; (4) fan-shaped groups resembling stilbite. Associated minerals are aragonite, phacolite, and calcite. V. Z.

GAERTNER (H. R. v.) & MACHATSCHKI (Felix). *Der Thomsonit aus dem Basalte von Disko, Grönland.* Centr. Min., 1927, Abt. A, pp. 365–366.

Thomsonite from the basalt of Disko Island, Greenland, formed white spherical aggregates of fine needles. Two analyses gave: SiO_2 41.55 (41.73), Al_2O_3 30.13 (29.80), CaO 11.20 (11.28), Na_2O 3.43 (3.56), K_2O 0.52 (0.46), H_2O 13.07 (13.21), total 99.90 (100.04), agreeing approximately with $\text{Na}_2\text{Ca}_3\text{Al}_8\text{Si}_9\text{O}_{24} \cdot 9\text{H}_2\text{O}$. A dehydration curve was obtained, but no precise conditions are given. M. H. H.

UDLUFT (Hans). *Zeolithe als Fossilisationsmaterial.* Arkiv Kemi, Min. Geol., 1928, vol. 9, no. 33, 15 pp., 2 pls.

Fossilized wood from Mt. Elgon, Uganda, was studied analytically and optically. The fossilizing mineral was found to be mainly natrolite, more or less calciferous (galactite) [the author terms the calciferous material mesolite, but his optical data show it to be natrolite]. Calcite and apophyllite are also present. Well-developed natrolite crystals were present on one specimen, and gave: SiO_2 47.1, Al_2O_3 27.1, Na_2O 16.4, H_2O 9.44 %; sp. gr. 2.235. M. H. H.

HOLLER (K.). *Zeolith in Eruptivgestein. Ein Beitrag zum Problem des „Sonnenbrandes“.* Zeits. Prakt. Geol., 1930, vol. 38, pp. 17–20, 1 fig.; Fortschr. Min. Krist. Petr., 1929, vol. 14, p. 37.

Many basalts apparently uniform when freshly broken, show numerous pale patches after a short exposure to the air ('Sonnenbrand'). This behaviour is due to a hydrous, apparently glassy

groundmass, which has been supposed to be zeolitic in nature. The groundmass has a small birefringence and gives irregular extinction. The pale patches give a more continuous dehydration curve than the normal basalt. By centrifuging the finely powdered material of the light patches in Clerici solution of sp. gr. 2.45, the groundmass was approximately isolated, and an analysis of the lighter fraction gave: SiO_2 42.37, Al_2O_3 (Fe_2O_3) 17.01, MgO 6.62, CaO 8.85, K_2O 4.40, Na_2O 14.33, H_2O 5.83, total 99.41. The material gave a definite base-exchange with sodium and calcium chloride solutions. It is concluded that these basalts contain an alkali glass which is readily decomposed by moisture with the formation of a zeolitic mixture similar to spreustein. The base-exchange capacity of a number of other rocks was also studied.

M. H. H.

DI FRANCO (Salvatore). *L'analcite e il basalto analcitico dell'isola dei Ciclopi*. Boll. Soc. Geol. Ital., 1926, vol. 45, pp. 1-7, 1 pl., 4 text-figs.

The analcime of the Cyclopean Islands basalt is divided into two generations, one a primary crystallization from the rock magma, the other a subsequent formation which may amount to an almost complete replacement of the rock by analcime. The primary crystals carry inclusions of anorthite, magnetite, augite, and pyrite. The simple icositetrahedron (211) is rare, combinations of (211) and (100) being most common. The form (332), new for this occurrence, was also observed, in combination with (211) and with (211) and (100). The cube faces carry low vicinal pyramids (*hll*). Analysis gave SiO_2 54.10, Al_2O_3 23.68, Fe_2O_3 trace, MgO trace, CaO 0.45, Na_2O 13.40, K_2O 0.34, H_2O 8.22, total 100.19; sp. gr. 2.249.

M. H. H.

CAGLIOTI (V.). *Ricerche sulla composizione chimica della herschelite di Acicastello*. Rend. Accad. Sci. Fis. Mat. Napoli, 1927, ser. 3, vol. 33 (anno 66), pp. 156-163, 3 figs.

— *Ricerche su alcune zeoliti delle leucititi dei dintorni di Roma; la gismondite di Capo di Bove e la pseudophillipsite di Acquacetosa*. Ibid., pp. 163-177, 3 figs.

Analyses have been made of gismondite (*d* 2.278) from Capo di Bove (I), pseudophillipsite (*d* 2.258) from Acquacetosa (II), and herschelite (*d* 2.060) from Acicastello, Sicily (III); also a study of the dehydration, both over strong sulphuric acid in vacuo at the

ordinary temperature, and in a current of dry air (H_2SO_4 -dry) at various temperatures, and of the rehydration.

	SiO_2 .	Al_2O_3 .	Fe_2O_3 .	CaO .	BaO .	SrO .	K_2O .	Na_2O .	H_2O .	Total.
I.	33.89	28.14	0.004	13.96	0.27	0.025	2.86	—	20.76	99.91
II.	37.35	26.27	0.004	12.65	0.21	0.019	3.00	—	20.32	100.02
III.	44.73	21.18	0.001	1.65	—	—	4.53	8.04	20.11	100.24

M. H. H.

CURLO (Giacinta). *Analcite e laumontite di Murlo (Toscana)*. Ann.

Mus. Civ. Stor. Nat. Genova, 1928, vol. 52 (for 1925–1928), pp. 413–416.

Clear icositetrahedra of analcime from Murlo, Tuscany, gave: SiO_2 53.69, Al_2O_3 22.91, Na_2O 14.27 (by difference), H_2O 9.13. Laumontite from the same locality, translucent white crystal fragments, gave: SiO_2 50.90, Al_2O_3 21.51, CaO 11.76, H_2O 15.52, total 99.69. At 100°C . the laumontite lost 3.80 % H_2O , at 130°C . 4.15 %.

M. H. H.

GENNARO (Virginia). *Thomsonite e scolecite dell'alta Valle di Ayas e delle Valli di Lanzo*. Atti R. Accad. Sci. Torino, 1929, vol. 64, (for 1928–1929), pp. 133–143.

Thomsonite from the pass of Bettolina or Bettolina Nord, Valle di Ayas, Monte Rosa, gave analysis I, $2E\ 72^\circ$, positive, α 1.523, β 1.525, γ 1.537. Scolecite from the same locality, anal. III, gave α 1.510, β 1.518, γ 1.519. $Bx_a(a):c = 18^\circ$. Thomsonite from the Valle di Viù, Valle di Lanzo, gave anal. II, α 1.528, β 1.530, γ 1.538. Crystals of scolecite from this locality gave anal. IV, α 1.512, β and γ 1.519, while crystalline nodules gave anal. V. The refractive indices of thomsonites from the Faeroe Isles were α 1.517, β 1.520, γ 1.530; from Old Kilpatrick, α 1.529, β 1.531, γ 1.541; and from Franklin Furnace, α 1.530, β 1.532, γ 1.542.

	SiO_2 .	Al_2O_3 .	CaO .	Na_2O .	K_2O .	H_2O .	Total.	Sp. gr.
I.	37.35	29.17	13.80	4.62	0.24	14.62	99.80	2.25
II.	37.18	31.81	12.54	3.46	0.14	15.72	100.85	2.26
III.	46.37	25.80	13.58	0.64	0.13	13.84	100.36	2.25
IV.	45.56	25.70	14.23	0.50	0.11	14.43	100.53	2.27
V.	44.63	26.68	13.63	0.66	0.18	13.50	99.28	—

M. H. H.

GAUBERT (Paul). *Sur la déshydratation de la heulandite*. Compt. Rend. Acad. Sci. Paris, 1930, vol. 190, pp. 802–804.

A brief study of heulandite dehydrated at 245°C ., and measurements of the refractive index of heulandite after dehydration at

several temperatures. A dihydrate is produced irreversibly at about 245° C., the change being abrupt. [Cf. M.A. 4-322.] M. H. H.

GAUBERT (Paul). *Contribution à l'étude de la heulandite*. Troisième note. Bull. Soc. Franç. Min., 1929 [i. e. 1930], vol. 52 (for 1929), pp. 162-194, 12 figs. [Cf. M.A. 4-322.]

The author describes experiments on the diffusion of water and other liquids in the heulandite lattice. The changes in optical properties of various heulandite crystals partially dehydrated and then immersed in vaseline oil are noted. The partially dehydrated crystal shows before immersion three zones, each corresponding to different water content. During oil immersion the gradual diffusion of water takes place till the whole crystal is uniformly hydrated. Both the optic axial angle and the angle between the trace of the optic axial plane on the (010) face and the edge [010,001] decrease. To study diffusion of other liquids in heulandite the crystal is heated at various temperatures till it is optically uniform before immersion. Rates of diffusion for different liquids vary, but diffusion is always more rapid perpendicular to the face (001) than to ($\bar{2}$ 01) and (201) [Dana's axes]. The rate of diffusion also increases with the temperature to which the heulandite has been heated, providing this temperature does not exceed 245° C. The optical properties of heulandite containing liquids other than water are practically those of dehydrated crystals. Unfortunately, the author has not been able to correlate water content with optical properties in his experiments and does not give the chemical composition of the material investigated. F. A. B.

Miscellaneous.

VASSOEVICH (N. B.) & RAZUMOVSKY (N. K.) Вассоевич (Н. Б.) и Разумовский (Н. К.). Юйлит (whewellite, Brooke 1840) из третичных слоев Майкопского округа (Сев. Кавказ).—VASSOYEVICZ (N. B.) and RAZUMOVSKY (N. K.). *On the whewellite from the Tertiary strata of the Maykop region (northern Caucasus)*. Зап. Росс. Мин. Общ. (Mém. Soc. Russe Min.), 1928, ser. 2, vol. 57, pp. 275-300, 1 fig. (Russ. with Engl. summary, pp. 299-300.)

Yellowish tabular crystals of whewellite were found in crevices in calcareous concretions from bituminous Eocene clay near Khodyzhenskaya in the Maikop district. At the edges they show the forms c ($\bar{1}$ 01), b (010), k (102), t ($\bar{1}$ 03), and they are twinned on ($\bar{1}$ 01). Sp.

gr. 2.22, H. $3\frac{1}{2}$, α 1.49, β 1.55, γ 1.65, $2V$ $82\frac{1}{2}^\circ$, positive. Analysis by M. V. Butkova gave CaO 35.80, C_2O_3 46.92, H_2O 10.60, $CaCO_3$ 6.68. The mineral is partly replaced by quartz and calcium carbonate. Whewellite is known from only eleven localities. A summary of the literature is given. P. N. C.

[DOLIVO-DOBROVOLSKY (V. V.)] Доливо-Добровольский (В. В.). Кристаллы шестиводного сернокислого магния (гексагидрита, $MgSO_4 \cdot 6H_2O$).—DOLIVO-DOBROVOLSKY (W. W.). *Kristalle des Magnesium-Sulfat-Hexahydrat (Hexahydrat)*. Зап. Росс. Мин. Общ. (Mém. Soc. Russe Min.), 1929, ser. 2, vol. 58, pp. 3–63, 33 figs. (Russ. with Germ. summary, pp. 57–62.)

In the Saki salt lakes, Crimea, after the separation of sodium chloride, there is a separation of spear-shaped crystals of magnesium sulphate differing in form from epsomite, although showing on analysis the composition $MgSO_4 \cdot 7H_2O$. There are also thick tabular crystals with the composition $MgSO_4 \cdot 6H_2O$. These crystals are monoclinic, $a : b : c = 1.4018 : 1 : 1.6945$, $\beta = 81^\circ 46'$, agreeing with C. de Marignac's measurements (1857) on artificial crystals of the hexahydrate. The spear-shaped crystals show the forms a (100), c (001), m (110), ρ ($\bar{1}01$), σ ($\bar{2}01$), o (111), ω ($\bar{1}11$), y ($\bar{1}12$), ξ ($\bar{2}21$); cleavage (100) perfect, twinning on (001) and (110); α 1.426, β 1.453, γ 1.456, $\beta = b$, $a : c = -25^\circ$, $2V$ 38° , negative. Crystals of $MgSO_4 \cdot 6H_2O$ artificially prepared at a higher temperature (60° C.) show the forms c m , and as the degree of supersaturation falls other forms appear. At lower temperatures (about 20° C.) the crystals have at first the forms m y ρ a . In all, 25 forms were noted on the artificial crystals.

P. N. C.

[PADUROVA (O. G.)] Падурова (О. Г.). Кристаллы вольфенита из Алмалыка.—PADUROVA (O.). *Krystalle des Wulfenites aus Almalik*. Зап. Росс. Мин. Общ. (Mém. Soc. Russe Min.), 1929, ser. 2, vol. 58, p. 109–115, 3 figs. (Russ. with Germ. summary, p. 115.)

Crystals (1 mm.–1 cm.) of wulfenite from Almalyk in the Tyuya-Muyun district, Fergana, are of two habits. (1) Wax-yellow tabular crystals with the forms ctu (407) ye (201) ρsn (1.2.16) [Dana's letters], and $a : c = 1 : 1.5773$. (2) Orange-yellow pyramidal crystals with cu (407) e (701) s (112) n , and $a : c = 1 : 1.5710$. Micro-chemical tests showed the presence of Mo, Pb, Ba. P. N. C.

[ZAVARITZKY (A. N.)] Заварицкий (А. Н.). Сульфатный канкринит из Ильменских гор.—ZAVARITZKY (A. N.). *Sulphatic cancrinite from the Ilmen Mountains (South Ural)*. Зап. Росс. Мин. Общ. (Mém. Soc. Russe Min.), 1929, ser. 2, vol. 38, pp. 201–207, 1 fig. (Russ. with Engl. summary, p. 207).

A bluish mineral occurring as small nests and veinlets in large crystals of nepheline in pegmatite veins in the nepheline-syenite of the Ilmen Mts. has sp. gr. 2.35, H. 5, hexagonal cleavage, and is optically negative with n 1.492–1.493, birefringence 0.0007. Two analyses by Y. V. Morachevsky gave SiO_2 34.78 (35.29), Al_2O_3 28.77 (28.79), Fe_2O_3 0.10 (0.19), MgO 0.12 (0.10), CaO 1.27 (1.49), Na_2O 15.59 (15.65), K_2O 4.90 (4.15), H_2O 7.01 (7.62), CO_2 0.89 (1.01), SO_3 6.25 (5.76), totals 99.68 (100.05). These show more sulphate than the sulphatic cancrinite from Colorado [M.A. 1–256]. The name cancrinite was applied to this mineral by Kämmerer in 1828 (Russian Mining Journ. vol. 4, p. 128) and from Gmelin's analysis it was described as a sulphur-bearing elaeolite. G. Rose (1839) transferred the name to the mineral now known as cancrinite. L. J. S.

LONDÝNOVÁ (Jiskra). *Dvě mineralogické zprávy z Moravy.—Deux communications minéralogiques de Moravie*. Věstník Státního Geol. Ústavu Československé Republiky, 1929, vol. 5, pp. 125–130, 2 figs. (Czech with French résumé.)

Fluorite in crevices in granodiorite from Tečice near Brno: a greenish crystal showed the forms $ak\epsilon e$ [Dana's letters]. A pseudomorph of calcite after fluorite (od) has $(10\bar{1}1)$ of the calcite nearly parallel to (110) of the fluorite. Aragonite as acicular crystals on serpentine from Moravský Krumlov shows on three crystals the acute pyramids (991), (881); (25.32.2), (25.33.2); (27.22.2), (15.12.1), (23.19.2), in each case terminated by (011) . [$a:b:c = 0.6224:1:0.7206$.]

F. S.

SEKANINA (Josef) & VYSLOUŽIL (Josef). *Nové zprávy o lepidolithu od Rožné.—Les nouveaux rapports sur lepidolite de Rožná, Moravie*. Práce Moravské Přírodovědecké Společnosti (Acta Soc. Sci. Nat. Moraviae), Brno, 1928, vol. 5, pt. 2, pp. 25–31, 1 pl., 1 text-fig. (Czech with French résumé, p. 31.)

The larger (3 cm.) plates of pink lepidolite from Rožná have the optic axial plane $\perp (010)$ (i.e. a mica of the first order), $2E$ 63° , β 1.558, sp. gr. 2.832. Most of the plates are complex interpenetra-

tion twins on (110) of three individuals. Analysis gave SiO_2 47.63, Al_2O_3 28.69, Fe_2O_3 trace, FeO 0.33, MnO 0.75, MgO 0.18, CaO 0.35, Na_2O 1.05, K_2O 11.29, Li_2O 4.87, F 6.81, $\text{H}_2\text{O}(+105^\circ)$ 1.28, $\text{H}_2\text{O}(-105^\circ)$ 0.31, less O for F 2.87, total 100.67, agreeing with $\text{H}_4\text{Li}_9(\text{K},\text{Na})_8\text{Al}_{16}\text{Si}_{22}\text{O}_{75}\text{F}_{10}$. The compact green lepidolite from the same locality consists of minute scales with fine zonal structure. This is also a mica of the first order with β 1.559 and twinning on (110), but the symmetry appears to be lower than monoclinic. F. S.

TOKODY (László). *Proustit és xanthokon Nagyágról.*—*Proustit und Xanthokon von Nagyág.* Mat. Természett. Értesítő, Magyar Tudom. Akad. Budapest, 1929, vol. 46, pp. 644–651 (Hung.), pp. 652–656 (Germ.), 5 figs.; Centr. Min., Abt. A, 1930, pp. 117–123, 5 figs.

Proustite and xanthoconite, new for Nagyág, were found on a specimen consisting mainly of nagyagite, with quartz, dolomite, native arsenic, pyrite, and chalcopyrite. The proustite crystals ($\frac{3}{4}$ – $1\frac{1}{2}$ mm.) are prismatic with scalenohedral or rhombohedral terminations; forms $ma\bar{r}epnv$, $e'(7.3.\bar{1}0.13)$, $\xi(51\bar{6}7)$; twins on r and $u(10\bar{1}4)$. Orange-red crystals (less than 1 mm.) of xanthoconite are tabular on $c(001)$ with $t(223)$, $p(111)$, $P(11\bar{1})$, $r(332)$, and new $u(553)$, $v(55\bar{3})$, $z(552)$ [$a:b:c = 1.9187:1:1.0152$, $\beta = 88^\circ 47'$]. Analysis by E. Endrédy of the nagyagite gave Te 17.80, S 9.10, Sb 8.62, Au 7.61, Pb 54.50, Fe 0.93, quartz 2.12 = 100.68. V. Z.

KOCH (Sándor). *Eulithin Dognácskáról.*—KOCH (A). *Eulithin von Dognácska.* Mat. Természett. Értesítő, Magyar Tudom. Akad. Budapest, 1929, vol. 46, pp. 640–642 (Hung.), p. 643 (Germ.) 2 figs.

Sulphur-yellow crystals of eulytine, $\text{Bi}_4(\text{SiO}_4)_3$, from the Markus mine, Dognácska, are in a cavity in a chrysocolla vein traversing chalcosine. The larger (1 mm.) crystals are cubic in habit and the smaller triakistetrahedral; forms $ao'o'n$. The mineral was probably formed by the action of silicate solutions on the bismuth-bearing chalcosine. V. Z.

KOCH (Sándor). *Kénkristályok Aikáról és Pilis-Szent-Ivánról.*—*Schwefelkristalle von Ajka und Pilis-Szent-Iván.* Ann. Hist.-Nat. Musei Nationalis Hungarici, 1928, vol. 25, pp. 451–453 (Hung.), pp. 454–455 (Germ.), 3 figs.

Minute (1 mm.) crystals of sulphur were formed by the burning of heaps of lignite. Thirteen crystal-forms are noted. V. Z.

VENDL (Mária). *Kvarc a Szepes-Gömöri Ércegségből.*—VENDL (Marie). *Quartz de la montagne métallifère de Szepes-Gömör.* Ann. Hist.-Nat. Musei Nationalis Hungarici, 1928, vol. 25, pp. 76-77 (Hung.), p. 78 (French), 2 figs.

Description of a large (25 cm.) colourless and nearly transparent crystal of quartz, with inclusions of micaceous haematite and showing the forms rxm . V. Z.

VENDL (Mária). *Nógrádmegyei bazaltok aragonitkristályairól.*—VENDL (Marie). *Über Aragonitkristalle der Basalte aus dem Komitat Nógrád.* Ann. Hist.-Nat. Musei Nationalis Hungarici, 1928, vol. 25, pp. 69-73 (Hung.), pp. 73-75 (Germ.), 5 figs.

Prismatic crystals (1×6 mm.) of aragonite from cavities in basalt from Salgótarján, Co. Nógrád, show the forms $cbkxmps$. Acicular crystals from basalt from the Medves Mts. show bkm and (24.24.1). V. Z.

LÖW (Márton) & TOKODY (László). *Adatok Nagybánya és Borpatak ásványainak ismeretéhez.*—LÖW (M.) & TOKODY (L.). *Beiträge zur Kenntnis der Mineralien von Nagybánya und Borpatak.* Földtani Közlöny, Budapest, 1929, vol. 58 (for 1928), pp. 87-92 (Hung.), pp. 212-215 (Germ.), 4 figs.

Crystallographic determinations on the following minerals. (1) Pyrite from Borpatak, forms $ae\zeta$ [Dana's letters]. (2) Pyrargyrite from Nagybánya, $amret$; from Borpatak $amrep$. (3) Tetrahedrite from Nagybánya, (111), (988), (655), (433), (322), (855), (744) (211), (522), and new (11.3.3). (4) Baryte from Borpatak cmz . V. Z.

LIFFA (Aurél) & TOKODY (László). *Adatok a délausztráliai atakamit kristálytani ismeretéhez.*—*Beiträge zur kristallographischen Kenntnis des Atakamits aus Südastralien.* Földtani Közlöny, Budapest, 1929, vol. 58 (for 1928), pp. 39-45 (Hung.), p. 170 (Germ.), 1 fig. [See M.A. 3-302.]

VAVRINECZ (Gábor). *Recski ásványok elemzése.*—*Analysen von Mineralien aus Recsk (Komitat Heves).* Magyar Chem. Folyóirat, Budapest, 1929, vol. 35, pp. 4-9 (Hung. with Germ. résumé).

Chemical analyses are given of sulphates from the enargite mine near Recsk. Chalcantite, as fibrous masses I, intergrown crystals II. Melanterite, fibrous mass III, crystals with associated halotrichite IV. Pisanite V-IX [cf. M.A. 3-504], with FeO/CuO ranging

from 5.91 to 1.45. Halotrichite, white with silky lustre, X mean of five analyses. Brochantite, crystalline encrusting chalcantite XI, earthy on decomposed rock XII.

	SO ₃ .	CuO.	Al ₂ O ₃ .	Fe ₂ O ₃ .	FeO.	CaO.	Insol.	H ₂ O (diff.).	Sp. gr.
I.	30.18	29.64	—	—	0.13	—	5.27	34.78	2.292
II.	32.0	30.5	—	—	0.5	0.6	—	36.4	—
III.	28.81	0.14	0.65	—	24.15	—	3.05	43.20	1.87
IV.	28.30	2.47	—	—	23.78	—	1.90	43.55	1.901
V.	—	4.60	—	—	21.24	—	1.67	—	1.909
VI.	28.17	6.84	—	—	18.95	—	1.39	—	1.918
VII.	—	8.33	—	—	—	—	0.16	—	1.919
VIII.	28.53	8.50	—	—	17.54	—	1.31	—	1.937
IX.	—	11.50	—	—	15.12	—	0.26	—	1.932
X.	34.32	0.27	10.46	1.17	7.45	trace	—	46.33	1.88
XI.	15.6	55.8	—	—	4.6	2.9	—	21.1	—
XII.	17.1	56.1	2.8	—	1.3	1.9	0.3	20.5	—

V. Z.

DIEFENBACH (A.). *Mineralogische und chemische Untersuchung von Descloizit und Mottramit aus dem Otavibergland (Südwestafrika).*

Zeits. Krist., 1930, vol. 74, pp. 155–188, 2 pls., 14 text-figs.

These minerals occur in sandy pockets in limestone and dolomite. The large series of specimens examined from various localities show five types grading from distinct crystals to reniform masses. Crystals of descloizite are dark-green to black, but reddish on fractured surfaces; the streak is yellowish-green. Some crystals are honey-yellow. On crystal-faces the hardness is $4\frac{1}{2}$ –5, but in the interior $3\frac{1}{2}$ parallel to the *c*-axis and 3 perpendicular thereto. Measurable crystals from Uitsab and Olifantsfontein are pyramidal in habit with curved faces; forms *abcmevo* [Dana's letters], and new *y*(120), *r*(101), *p*(121); *a*:*b*:*c* = 0.6448:1:0.8022. Seven analyses are given of descloizite (I and II of crystals from the same specimen, showing a slight difference in composition; III of dark and IV of light crystals; all from Uitsab) and three of mottramite (V–VII from Tsumeb and Uitsab).

	V ₂ O ₅ .	As ₂ O ₅ .	P ₂ O ₅ .	PbO.	CuO.	ZnO.	FeO.	H ₂ O (hygr.).	H ₂ O.	Total.	Sp. gr.
I.	22.45	—	—	55.16	2.75	17.30	—	0.08	2.18	99.92	} 5.988
II.	22.61	—	—	53.94	2.94	18.50	—	0.07	2.23	100.29	
III.	22.58	—	—	54.68	2.95	16.77	0.62	0.07	2.22	'99.88'	5.992
IV.	22.66	—	—	54.79	2.95	16.70	0.63	0.01	2.22	99.96	5.990
V.	22.15	1.15	trace	50.33	22.08	0.46	0.52	0.06	4.73	'99.78'	6.033
VI.	21.68	1.43	0.09	49.49	20.76	0.68	—	0.07	4.31	99.87	6.121
VII.	21.40	1.27	0.10	49.93	19.89	0.43	—	0.07	4.24	'99.74'	6.107

V, including MnO trace. VI, Al₂O₃ 0.47, Fe₂O₃ 0.32, MnO 0.39, CaO trace, SiO₂ 0.18. VII, Al₂O₃ 0.62, FeO₃ 1.12, MnO 0.21, CaO 0.10, SiO₂ 0.26.

The analyses of descloizite (I-IV) agree closely with the formula $4(\text{Pb,Zn,Cu})\text{O.V}_2\text{O}_5.\text{H}_2\text{O}$, and those of mottramite (V-VII) with $4(\text{Pb,Cu})\text{O.V}_2\text{O}_5.2\text{H}_2\text{O}$. The extra molecule of water in mottramite is perhaps hygroscopic, and mottramite is regarded as merely a variety of descloizite; cuprodescloizite with 6-12% CuO being an intermediate variety [but no proof is given that the material examined is the same as the original mottramite of Roscoe]. Crystals are optically biaxial and positive, but owing to the high refraction, n_{Li} about 2.235, there is no emergence of the optic axes through oriented plates. Sections of crystals show a zonal structure with bands of different colours and pleochroism; and a complex zonal structure is also shown in reflected light on polished and etched surfaces. Sections of the confused aggregates of mottramite show the same optical characters and zonal growth.

L. J. S.

O'DANIEL (H.). *Ein neues Tarnowitzitvorkommen von Tsumeb-Otavi und die Frage der wechselseitigen isomorphen Vertretung von Ca und Pb.* Zeits. Krist., 1930, vol. 74, pp. 333-362, 22 figs.

The tarnowitzite [plumbiferous aragonite] from Tsumeb in South-West Africa crystallizes in orthorhombic crystals, invariably twinned, whose faces are usually striated and have vicinal faces superimposed upon them. The crystals are composed of layers alternately richer and poorer in lead. Their specific gravity has a mean value of 3.015, and the crystallographic axial ratios are $a:b:c = 0.6212:1:0.7188$. X-ray analysis gives a unit cell containing four molecules of $(\text{Ca,Pb})\text{CO}_3$ and edges given by $a = 4.97$, $b = 8.06$, $c = 5.72 \text{ \AA}$, though these values can only be approximate owing to the lack of homogeneity of the material. The principal refractive indices are α 1.5397, β 1.6950, γ 1.7026, $2V$ $23^\circ 6'$ (for $\lambda = 5769.6$). Analysis gave CaO 51.97, PbO 5.29, CO_2 42.24, total 99.50, with Ca:Pb = 7.6:1; another analysis shows PbO 4.53%. The percentages of CaO and PbO in various known minerals are tabulated. Attempts to prepare mixed crystals of calcium and lead nitrate, formate, sulphate, &c., gave no definite results.

H. H.

CISSARZ (Arnold). *Allopalladium und Clausthalit von Tilkerode im Harz und das Verhältniss von Allopalladium zu Potarit.* Zeits. Krist., 1930, vol. 74, pp. 501-510, 1 fig.

The potarite from British Guiana [Min. Mag. 21-397] contains a cubic and an anisotropic constituent, both of which are apparently

compounds of palladium and mercury. Allopalladium from Tilkerode is hexagonal and probably rhombohedral. It is distinct from both varieties of potarite. It is a palladium amalgam with a low percentage of mercury, containing also all the metals of the platinum group. Clausthalite also contains some mercury in addition to the platinum metals (excluding rhodium) and some copper, silver, cobalt, nickel, and zinc. H. H.

CRAWFORD (Wm. P.). *Notes on rickardite, a new occurrence.* Amer. Min., 1930, vol. 15, pp. 272-273.

Rickardite $[\text{Cu}_4\text{Te}_3]$, previously recorded from two localities in Colorado and from San Sebastian mine, Salvador, has been detected in the crushed ore of the Junction mine, Warren, Arizona, as small purple fragments, which gave reactions for tellurium. L. J. S.

MURRAY (D. G.). *Constitution of a copper telluride from the Kalgurli G. M. [gold mine], Kalgoorlie.* Journ. Roy. Soc. W. Australia, 1930, vol. 16 (for 1900-1931), pp. 71-74.

The material examined was received in the form of a fine black powder. Analyses of the portions soluble in ammonia (Cu 31.80, Te 39.26 %), potassium cyanide solution, and nitric acid suggest that it is a mixture of copper telluride, native gold (25 %), and a telluride of gold and copper. The copper telluride is doubtfully referred to weissite, Cu_5Te_3 [M.A. 3-367], but it is possible that both this and rickardite (Cu_4Te_3) are mixtures of the tellurides Cu_2Te and CuTe that have been prepared artificially. [A copper telluride from Kalgurli gold mine was provisionally referred to rickardite by E. S. Simpson, Bull. Geol. Survey W. Australia, 1912, no. 42, p. 94; and specimens with native gold in the British Museum collection since 1910 have been placed under this species.] L. J. S.

BRAUNS (R.). *Einige Beispiele für zyklische Zwillingbildungen.* Centr. Min., Abt. A, 1929, 357-366, 9 figs.

Pseudo-hexagonal cyclic twins of three or six individuals are figured for potassium sulphate and alexandrite. L. J. S.

ROSICKÝ (V.). *Sur l'anglésite de Tsumeb, Otavi (Afrique Sud-Orientale) [i.e. South-East].* Bull. Soc. Franç. Min., 1926, vol. 49, pp. 160-163, 3 figs.

Goniometric measurements of various specimens showed the forms ψd , yd , and yc . In these combinations ψ and y are the prominent forms. [Dana's letters and axes.] F. A. B.

DATE DUE

[illegible]

HIGHSMITH 45-220



3 8198 313 599 605
THE UNIVERSITY OF ILLINOIS AT CHICAGO



